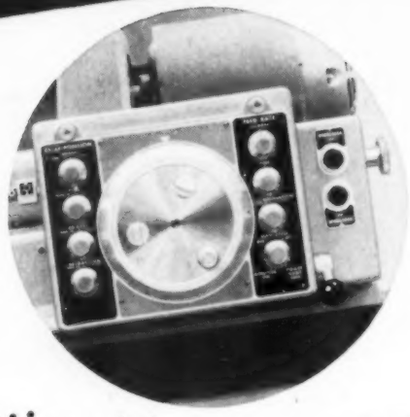
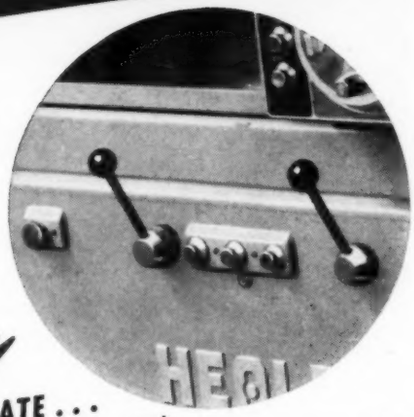
reating a Kodak • Ford Handles by Automation • How Buick makes the Dynaflow

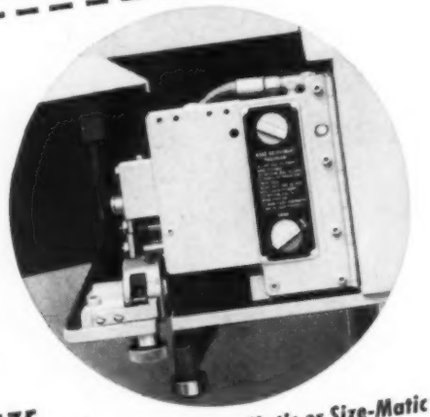
NEW HEALD
INTERNAL GRINDING MACHINES



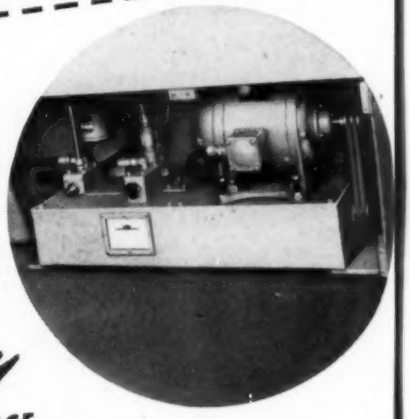
Easy
TO SET UP . . .
quick, accurate dial feed settings



Easy
TO OPERATE . . .
convenient, centralized controls



Easy
TO HOLD SIZE . . .
automatic, uniform size control with Gage-Matic or Size-Matic sizing



Easy
TO SERVICE . . .
accessible, roll-out hydraulic unit

and . . *Easy on Costs!*

Every feature of the new Heald Internal Grinding Machines is designed to help you turn out better work—*easier, faster* and *at lower costs*. All together, they represent a major advance in precision grinding technique.

Besides the features shown, new Heald Internals provide uniform, preset feeds that remain constant regardless of temperature changes; isolated hydraulic unit preventing transmission of accuracy-destroying heat and vibration; improved cylinder and piston design; automatic lubrication; universal valve manifold; leak-proof flared steel tubing; permanently-lubricated cool-running wheelheads; more rigid workheads.

These new Heald Internals can give you a new conception of precision and low costs in internal grinding . . . and they're built in a complete range of sizes in Chucker and Centerless models to meet your requirements. We invite you to get complete information from your Heald Representative, or contact Worcester direct.

Heald Model 271
Gage-Matic

HEALD

THE HEALD MACHINE COMPANY, Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

TECHNOLOGY DEPARTMENT

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

PUBLIC LIBRARY
OCT 20 1948
DETROIT

BURNHAM FINNEY ..... Editor
E. J. TANGERMAN ..... Managing Editor

•

Associate Editors: RUPERT LE GRAND, BEN C. BROSHEER (Chicago), ANDERSON ASHBURN, H. E. LINSLEY, CHESTER S. RICKER (Detroit), J. J. McGUINNESS (News), MILES J. ROWAN

•

Assistant Editors: CHARLES D. EMERSON, EILEEN ERSHLER

•

SYDNEY OXBERRY ..... Art Director
RICHARD ROOMAN ..... Assistant
ANNE PALMER ..... Makeup

•

DEXTER KEEZER .. Director, Economics Dept.

•

JOHN CHAPMAN .... World News Director

•

GEORGE E. DOYING, JR. ..... Washington

•

FRED H. COLVIN ..... Editor Emeritus

•

ALBERT HAUPTLI, JR. ..... Publisher
WILLIAM E. KENNEDY ..... Asst. Publisher

•

District Managers: JOHN H. KOCH, M. A. WILLIAMSON, JR., Statler Building, Boston, Mass.; JAMES A. McGRAW, HUGH BRITTON, 330 W. 42nd St., New York 18, N. Y.; DAVID G. JONES, Architects Bldg., 17th & Sansom Sts., Philadelphia 3, Pa.; RAY DEEN, ANSON E MEANOR, 520 N. Michigan Ave., Chicago, Ill.; ADOLPH F. TISCHER, Hanna Bldg., Cleveland, O.; ROBERT H. ANDERSON, 1110 Delta Ave., Cincinnati, O.; PHILIP G. WEATHERBY, Penobscot Bldg., Detroit, Mich.; JOHN W. OTTERSON, 68 Post St., San Francisco, Calif., CARL DYSINGER, 621 So. Hope St., Los Angeles, Calif.; R. C. MAULTSBY, Rhodes-Haverty Bldg., Atlanta, Ga. Other offices: Continental Bldg., St. Louis, Mo.; National Press Bldg., Washington, D. C.; Oliver Bldg., Pittsburgh, Pa.; Aldwych House, Aldwych, London, W.C. 2.

•

Member of the Associated Business Papers and the Audit Bureau of Circulations.

•

COPYRIGHT 1948 by McGraw-Hill Publishing Company, Inc. All rights reserved.

•

Published every other Thursday. Price 35c per copy. Allow ten days for change of address. Subscription Rates: United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada, $6 for one year, $10 for two years, $12 for three years. Pan-American countries, $10 for one year, $16 for two years, $20 for three years. All other countries, $20 a year, $30 for two years, $40 for three years. Please indicate position and company connection on all subscription orders. Entered as second-class matter, August 13, 1943, at Post Office, New York, N. Y., under the act of March 3, 1879. Printed in U. S. A. Return postage guaranteed.

American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index.

CONTENTS for OCTOBER 21, 1948 ..... VOL. 92, NO. 22

Cover ..... *Operation pictured is described on page 2*

ADMINISTRATION

Editorial ..... *Burnham Finney* 89
Face-to-Face or Back-to-Back ..... *Round Table* 123

SPECIAL REPORT

Ford Handles by Automation ..... *Rupert LeGrand* 107

HEAT TREATING, WELDING

Roughen Stainless Before Nitriding ..... *S. Dedomenico* 96
Carbon Blocks Simplify Welding Jobs ..... *Phil Glanzer* 124

LUBRICATION

Planned Lubrication Cuts Maintenance Costs ..... *Charles H. Parks* 104

INSPECTION

Adaptor Checks Sharp V and Standard Threads ..... *Charles Shope* 126
Pivoting Indicator Tool Checks Vertical Angles ..... *Harry Smith* 129

FINISHING

Process Sheet for Chrome-Pickle Treatment ..... *(RBS)* 141

MATERIAL CUTTING

How Buick Builds the Dynaflow ..... *Chester Ricker* 91
Creating A Kodak ..... *H. E. Linsley* 98
Carbides Speed Copper Machining ..... *C. R. Morgan* 102
Tapered Thread Cut with Bar and Roller ..... *K. W. Thompson* 127
Drill Ground with Pilot Works Soft Sheets ..... *H. Scala* 128
Milling Machine Turns Collar ..... *L. Deresh* 128
Key Clamps Grooving Tool ..... *R. H. Bergmann* 130
Stamping Data ..... *(RBS)* 143

TOOLING

Datum Plate Locates Keyways ..... *John K. Smith* 127
Toolholder Handles Double Duty ..... *Frank Lovejoy* 127
Rubber Pads Cushion Gang Milling Setup ..... *G. R. Milner* 127
Pneumatic Plunger Replaces Bar Feed ..... *Donald E. Eaton* 128
Button-Die Threads Shouldered Studs ..... *Harold W. Cutting* 128
Drill Sleeve Confines Whipping ..... *Hugh F. Spinks* 129
Four Clamps Set By Tapered Cams ..... *F. W. Duce* 129
Setscrew Chuck Grips Odd Shapes ..... *Tyler G. Hicks* 130
Toolpost Slipper Clears Chips ..... *Charles Shope* 130
V-Tapered Rollers Center Bars for Punching ..... *H. Moore* 130

NEWS OF METALWORKING

Spot News 85
Gaging Metalworking 86
Plastic Show 131-134
Detroit News 136

DEPARTMENTS

Talking Shop 101
Reference Book Sheets 141
Shop Equipment News 147
Parts and Materials 164
Round Table Discussions 178
Free Literature Available .. 230A

PUBLISHED BY McGRAW-HILL PUBLISHING COMPANY, INC.
330 West 42nd St., New York 18, N.Y. Cables: "McGRAW-HILL, NewYork"

James H. McGraw (1860-1948), Founder; James H. McGraw, Jr., President; Curtis W. McGraw, Vice-President and Treasurer; Eugene Duffield, Executive Assistant for Publications; Nelson Bond, Director of Advertising; Joseph A. Gerardi, Secretary; J. E. Blackburn, Jr., Director of Circulation

Chips and QUIPS

Our Cover . . . Easy identification of assembly operations is made possible by painting color bands on the work-tray carriers of a carrousel conveyor in the assembly department of Eastman Kodak Camera Works. A typical scene is pictured on our cover Kodachrome.

Carriers are suspended from a chain conveyor and their lower ends engage a slot in the bench to prevent swinging when trays are pushed on to them. Operators identify their own operations by the color stripe. For example, one girl will take trays only from green-stripe carriers, and when the operation is completed, will replace the tray in a blue-stripe rack. The next operation may be performed several stations farther down the line; the blue trays remain untouched until they reach the appropriate operator who removes them, performs the work, and replaces them on red racks. Trays are made of aluminum and, even when loaded, are light enough to be handled from a sitting position.

The system permits all soldering operations to be grouped in one place under a common hood, and also allows separating operators who are not congenial even though they perform consecutive operations.

Once the conveyor is fully loaded, there is no delay or interruption of production, and if a tray is missed it merely travels on until it again comes back to the operator concerned, because no one else ever handles parts from a carrier of that particular color. For slow operations, of course, several operators may be assigned to one color sequence. All necessary components are loaded into appropriate trays as the conveyor passes through the stock room, and both major and subassembly operations are performed on the same line. Currently operating on one of the simpler cameras, the same principle may eventually be applied to the manufacture of even the most complicated types.

Some broadly applicable operations in making a Kodak are pictured in this issue, including blanking, turning, hobbing, milling and assembly.

Automation . . . Periodically, Associate Editor LeGrand goes on the prowl in his old hunting ground, Detroit. Several months ago, he nosed out a strictly hush-hush department at Ford—new in function, even new in name. In our Special Report in this issue, LeGrand brings you the first and exclusive story of this department and typical jobs.

Dynaflow . . . Well before public announcement of the Buick Dynaflow transmission, alert magazines were getting the story. The general and engineering magazines got theirs quickly, for the design was settled upon. Not so the production methods—Buick was still making manufacturing changes. But Chester Ricker stuck with it and has come up with three high-spot stories: last issue on machining brake bands for the unit; this issue detailing machining; and still to come, the precision casting methods . . . these are the jobs he spotted as new and broadly applicable from the blending of operations that results in any new product.

Carbon . . . Phil Glanzer, up in Canada, does quite a bit of factual writing about welding. This time he writes about carbon and its usefulness in odd welding jobs. He shows good block and bar shapes, provides in effect a special report in miniature.

Coming . . . *American Machinist* for November 4 will include a 16-page special report on inert-gas shielded welding prepared by engineers of Air Reduction Sales Corp. . . . There will also be a description of hiring methods of Hamilton Watch Company. For tool engineers, there are some cost-cutting milling setups, high spots in Allison's methods of machining diesel bearings, production methods on Yale & Towne electric irons, the Naval Gun Factory's method of reconditioning a surface plate, and another installment of our series, "Talented Tooling."

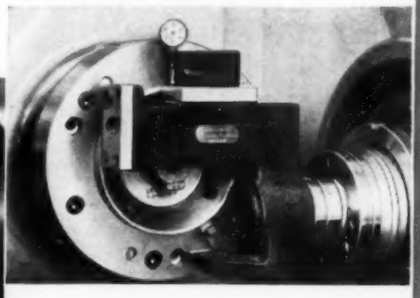
MAINTENANCE MAN . . . Charles H. Parks, author of the article in this issue on "Planned Lubrication Cuts Maintenance Costs," has been with The Bullard Company for 14 years. After attending the U. S. Naval Academy and Stevens Institute of Technology, he was employed by the Raybestos Company for two years. He joined Bullard in 1934 as a machine operator, which he continued to be for several years. Later he worked in the erecting, inspection, timestudy and routing depts. In 1939 he was appointed head of the Methods Dept.

During World War II, Mr. Parks was made assistant to the works manager, in charge of the Welding and Repair Depts., and responsible for maintenance of all productive equipment. In 1944, he became manager of the Standards Dept., and in 1946 assistant works manager.

GLEASON WORK HOLDING EQUIPMENT FOR GLEASON MACHINES

CHUCKS
ARBORS
SET-UP GAGES
QUENCHING DIES

Designed for rigidity, concentricity, accuracy of size, with ample uniform force provided for holding the gear properly, ease of chucking and dechucking the gear.



Advantages of obtaining work holding equipment from the manufacturer of the machine itself:

KNOW HOW—full knowledge of machinery capacities and design features make it possible for us to design the most adequate work holding equipment for any given bevel gear job.

PROPER EQUIPMENT—to produce the highest quality of tooling much of the equipment used is of necessity special. This includes machining equipment as well as special gages and other inspection equipment.

UNDIVIDED RESPONSIBILITY—when work holding equipment and machines are ordered from us we alone are responsible.

RELIABILITY—when ordering work holding equipment for existing machines, the tooling is properly designed to fit the particular machine for which it is ordered, wherever located.

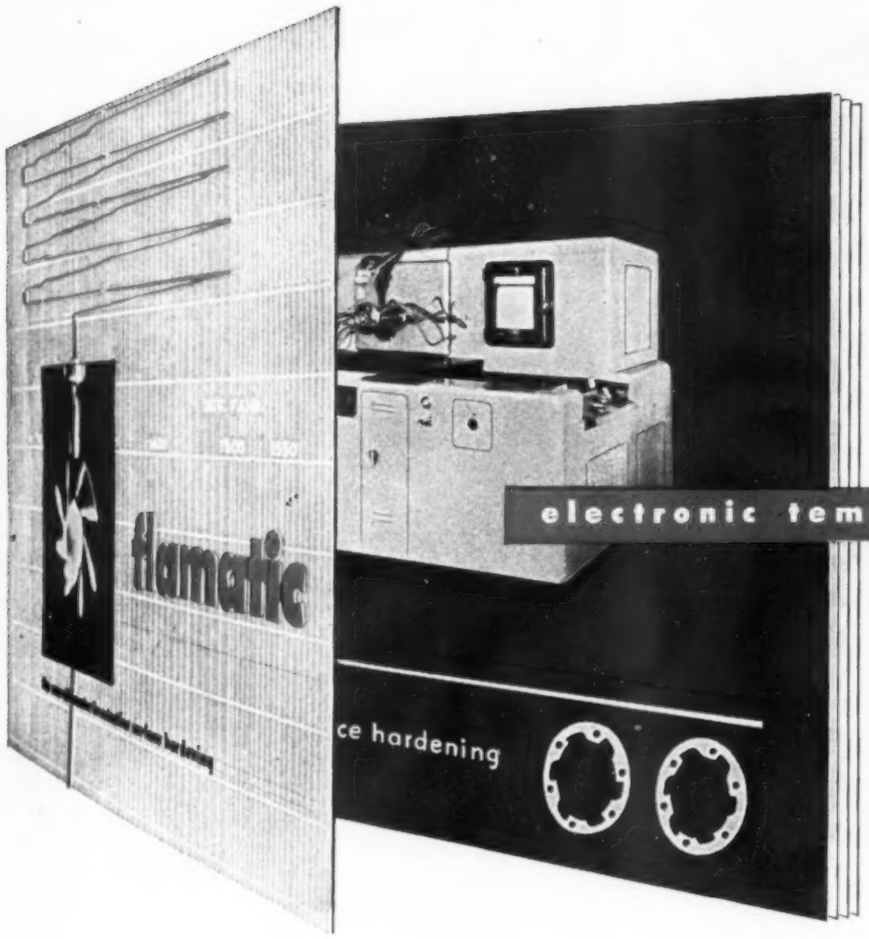
Write for your copy of Gleason Work Holding Equipment today for further information.

GLEASON Works
1000 University Avenue
Rochester 3, N.Y., U.S.A.

Builders of Bevel Gear Machinery for Over Eighty Years

thousands will learn the meaning of the new dimension in selective surface hardening ✻

flamatic exhibit



Whether you make, buy, process, or use heat treated parts, join the thousands who will see the Cincinnati Flamatic Exhibit at the Metal Show – featuring two difficult surface hardening jobs in actual production:

- cams for automatic torque converter transmissions
- take-off drive shafts for gear reduction units.

You will see how electronic temperature control – the new dimension in selective surface hardening – has led to higher physicals, better uniformity, faster production, and lower costs than ever before obtainable. Talk with Flamatic engineers, get specific data that will help you apply Flamatic to your requirements . . . Don't miss the Show! Don't miss Flamatic!

✻ ***Write for special Show Booklet, "The New Dimension in Selective Surface Hardening."***

NATIONAL METAL SHOW • BOOTH 1510

OCTOBER 25 TO 29, 1948

CONVENTION HALL, PHILADELPHIA

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI

Cincinnati 9, Ohio, U.S.A.

In Ten Years

OVER 99% HAVE NEVER TAKEN TIME OFF!

● No one knows how long FILMATIC bearings will last under normal shop conditions, for those which were built into CINCINNATI Grinders more than 10 years ago are still running at top performance. *Over 99% of all FILMATIC bearings—thousands of them—never have required time off for any reason whatever. And this period includes the war years, when machines were run all day and all night.*

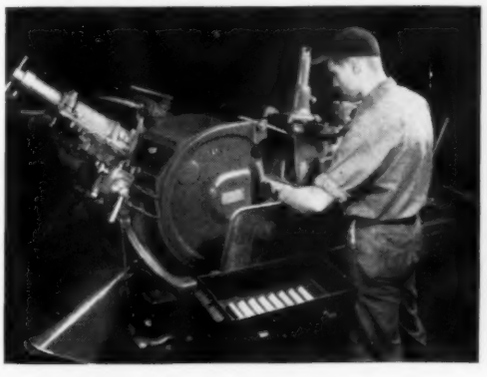
In addition to their dependable performance, you don't have to pamper FILMATIC bearings. CINCINNATI FILMATIC Grinding Machines take quick roughing or high-quality finish cuts without adjusting the bearings. Spark-out is quicker. No "pecking" of the diamond while truing.

FILMATIC'S perpetual youth, found only in CINCINNATI Grinding Machines, can save time and money in your shop. Specify a CINCINNATI FILMATIC for your next precision grinder. You can obtain brief description by writing for general catalog M-1646.

The FILMATIC principle. Self-adjusting shoes, submerged in filtered circulating oil, produce independent converging oil films which develop high radial pressures, maintaining "dead center" rotation of the grinding wheel spindle. Complete story may be obtained by writing for publication G-578.

ALL CINCINNATI GRINDING MACHINES AND CINCINNATI CENTERLESS LAPPING MACHINES ARE EQUIPPED WITH FILMATIC GRINDING WHEEL SPINDLE BEARINGS

FILMATIC



This CINCINNATI FILMATIC Centerless is a production veteran. It has been in continuous operation since 1937 with no down time charged against the grinding wheel spindle bearings, thanks to FILMATIC.

CINCINNATI GRINDERS INCORPORATED

CINCINNATI

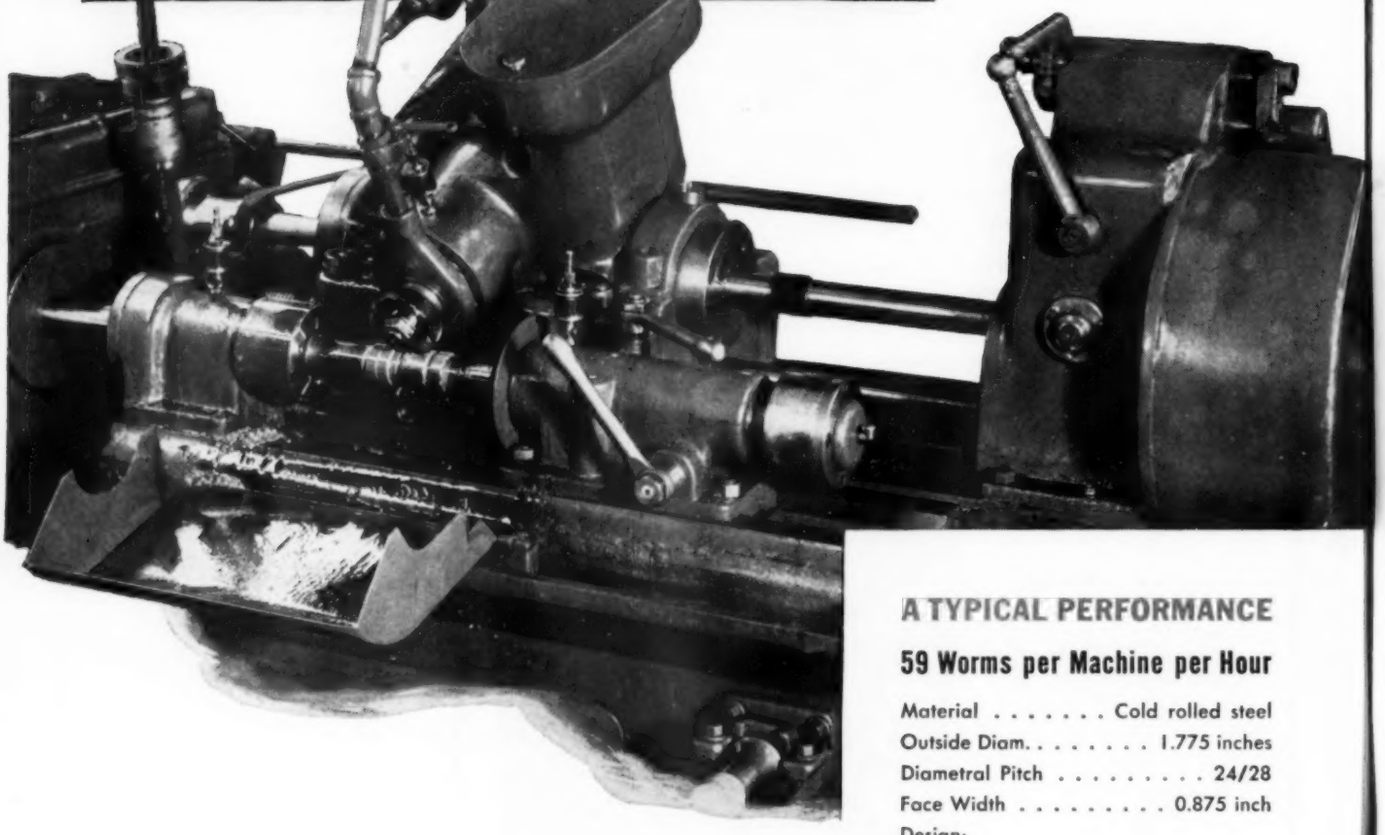
CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS LAPPING MACHINES • CENTERLESS GRINDING MACHINES

Cost-

FOR

A corner of the
14 machine installation
at the Stewart Warner plant
in Chicago



A TYPICAL PERFORMANCE

59 Worms per Machine per Hour

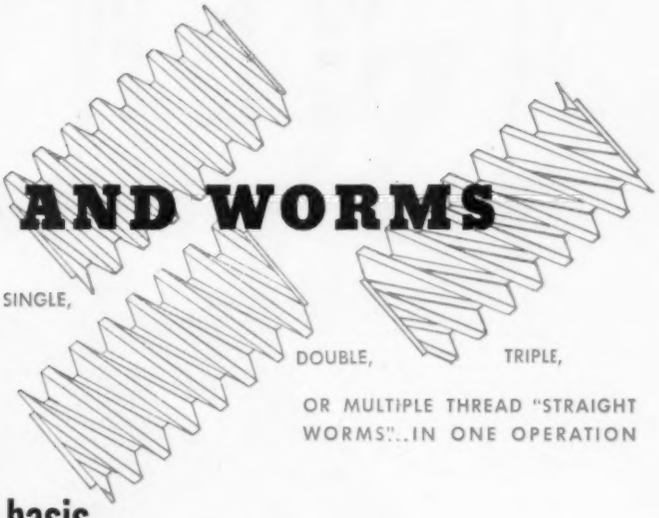
Material . . . . . Cold rolled steel
Outside Diam. . . . . 1.775 inches
Diametral Pitch 24/28
Face Width . . . . . 0.875 inch
Design:
Straight Worm, 20° pressure angle

NOTE:
5 blanks mounted on arbor are cut at one time. One operator runs 4 machines.

GEAR SHAPERS • THREAD GENERATORS • CUTTERS • SHAVING AND BURNISHING MACHINES

Saving Specialist

GENERATING THREADS AND WORMS



High-Speed Cutting and Flexibility, Qualify the Fellows Thread Generator for threaded work on a production basis

Using a Thread Generating Cutter, the Fellows Thread Generator does its cutting with the work and cutter revolving at predetermined rates. Cutting speeds can be 3 to 5 times as great as in turning or milling.

Stock is removed by a combined turning and shaving action, producing worms at a high rate of speed and with a smooth finish. Accuracy of thread shape is inherent in Fellows cutters, which can be duplicated indefinitely. Cutters are resharpened by a simple face grinding operation.

Machines are built in two sizes: No. 4T for work up to 4" O.D., 12" length, on pieces that will mount between 18" centers; and No. 2T for smaller work to 2" O.D., and 2½" length (8" centers). For more detailed data consult or write our nearest office.

Fellows

THE FELLOWS GEAR SHAPER COMPANY
Head Office and Export Dept., Springfield, Vermont. Branch Offices: 616 Fisher Bldg., Detroit 2; 640 West Town Office Bldg., Chicago 12; 7706 Empire State Bldg., New York 1.

GEAR MEASURING AND INSPECTION INSTRUMENTS • PLASTICS MOLDING MACHINES

A NEW GEM in

INDEPENDENT PNEUMATIC TOOL COMPANY

Aurora, Illinois

Export Division: 330 West 42nd Street, New York 18, N.Y.

Birmingham Boston Buffalo Chicago Cincinnati Cleveland Denver Detroit Houston
Los Angeles Milwaukee New York Philadelphia Pittsburgh St. Louis St. Paul
Salt Lake City Seattle San Francisco Toronto, Canada Sao Paulo, Brazil London, England

the Thor Silver Line

A new symbol of distinction in high quality, high lustre portable electric tools—*by Thor.*

PACKAGE OF STALL-PROOF POWER!

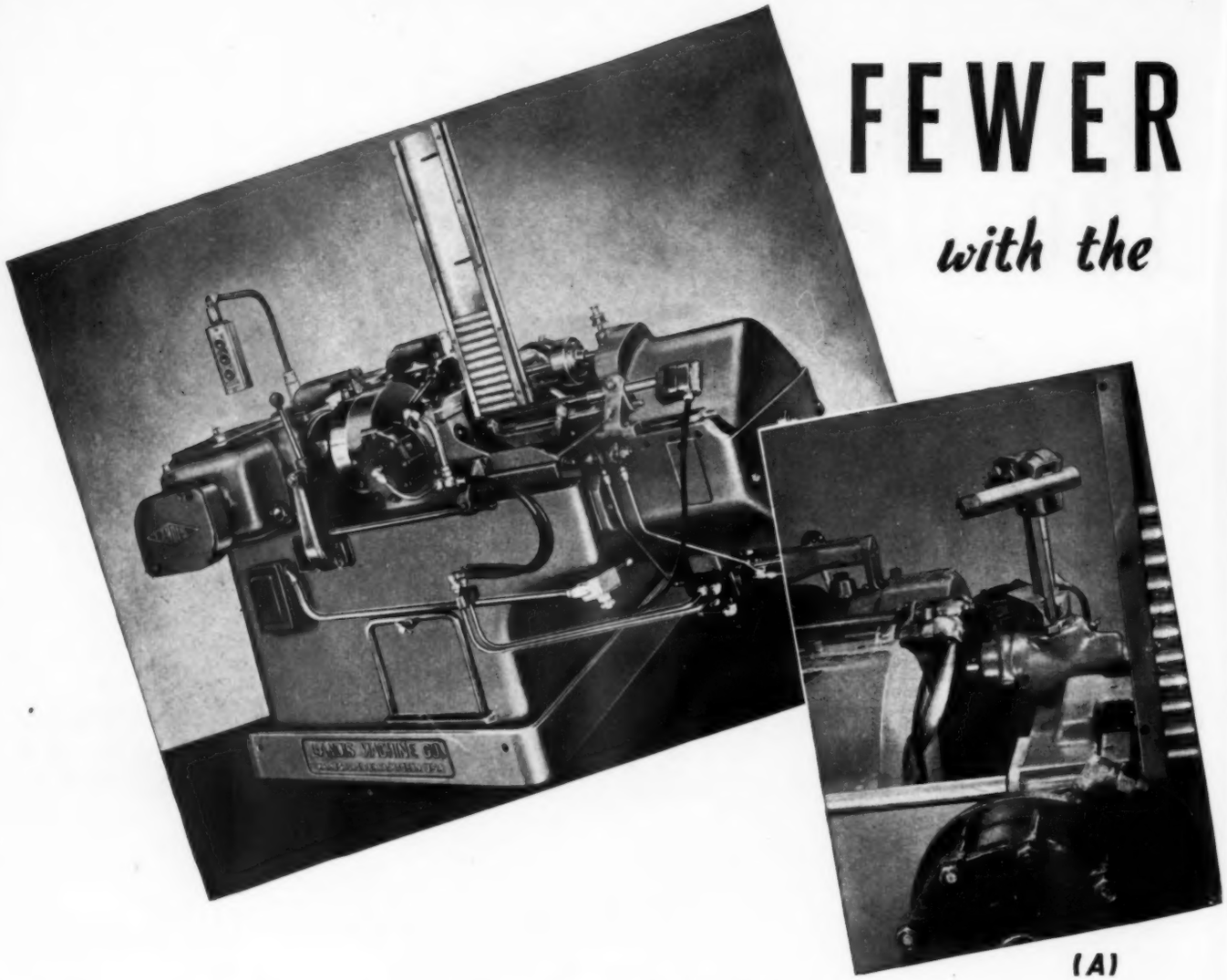
. . . the smallest, lightest, most POWERFUL ½-inch portable electric drill in the world — a statement no other manufacturer can make!

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

FEWER

with the



(A)

• NEW TRANSFER MECHANISM ALLOWS LONGER

The operation cycle of the Landis Automatic Nipple Machine is completely automatic. During operation, the operator is only required to give the machine visual attention and keep the magazine on the left-hand carriage filled with nipple blanks.

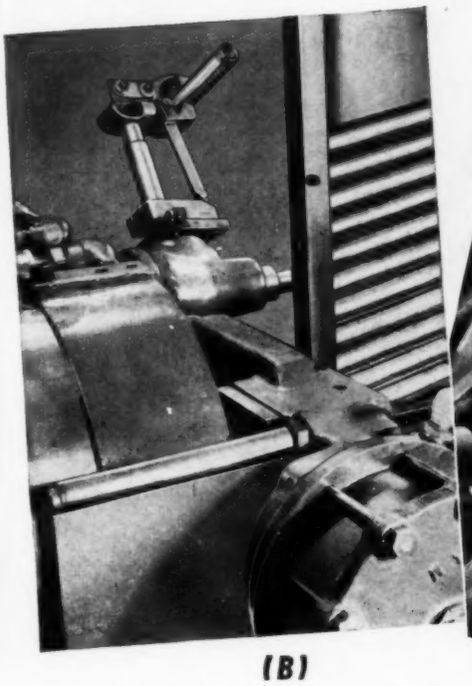
The nipple blanks are released automatically from the magazine by the forward movement of the carriage. After being pushed into position in the grips, they are held by the closing of the air-operated vise. The left-hand carriage advances rapidly to the thread-starting position, and then assumes a feed rate of travel equal to the lead of the thread being cut. An accurately-machined cam controls the entire carriage movement.

After the thread has been cut, and the reaming and chamfering operations simultaneously completed on one end of the nipple blank, the die head and vise open automatically and the carriage returns to loading position. The semi-finished nipple is left in position on the work-rest bar for transfer to the right-hand carriage. Mechanical fingers pick up the semi-finished

LANDIS MACHINE

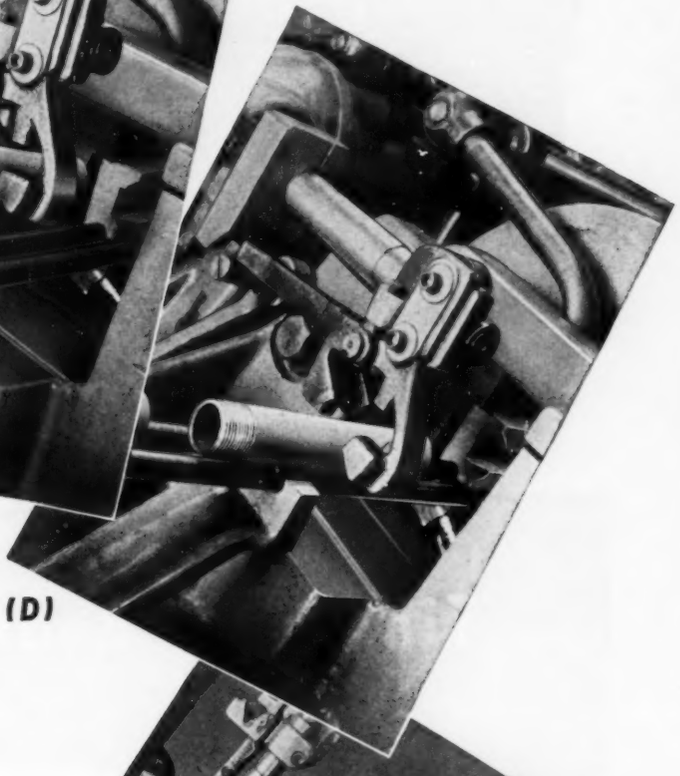
WORK STOPPAGES—

Improved LANDIS *Automatic Nipple Machine*



(B)

(C)



(D)

(E)

CONTINUOUS PRODUCTION

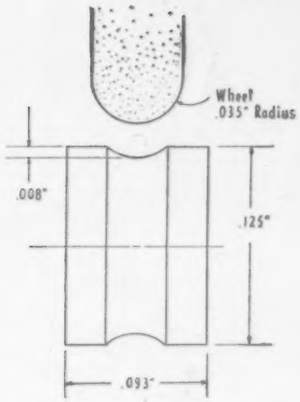
nipple (*A*), turn it end-for-end (*B* & *C*), and place it in position on the work-rest bar of the right-hand carriage (*D*). The semi-finished nipple is pushed into position and gripped for the threading, reaming, and chamfering operations on the unfinished end (*E*). After completion of the second operation, the finished nipple is automatically ejected. Simultaneous with the operations on the right-hand carriage, a second blank is beginning the operation cycle on the left-hand carriage. For further information, write for Insert to Bulletin No. D-84.

COMPANY

WAYNESBORO
PENNA · U. S. A.

EQUIPPED WITH MICROSPHERE BEARINGS

4" x 12" Type H
Plain Hydraulic Grinder
(Catalog A44)



Tiny Ball-Bearings / Ground to ±.0

features of standard machines

- All Controls Convenient for Operator
- Hydraulic Work Traverse
- Headstock Driven by Adjustable Speed Motor
- Hydraulic Automatic Wheel Feed
- Two Speed Hand Traverse

optional equipment illustrated

- Fender Type Radial Dresser
- Hydraulic Timer
- Hydraulic Straight Infeed
- Live Spindle Headstock
- Hydraulic Chucking

LANDIS TOOL *Precision Grinders*

Enlarged photo of a small ground bearing, now in quantity production at New Hampshire Ball Bearings, Inc., Peterborough, N. H. Shows lubrication by hypodermic syringe.

±.000025" Size Tolerance

ere are the results reported grinding this ny ball bearing inner race:

"Raceways of the inner rings are plunge round to form, on the Landis Tool 4" x 12" ype H hydraulic grinder with hydraulic timer, a size tolerance of plus or minus .000025" n the track diameter, radius true within 0005", run-out zero by 1/10,000 indicator, t a production rate of 50 pieces per hour."

A standard 4" Type H grinder was used with hydraulic straight infeed to the wheel base, hydraulic timer and a radial dresser. This aided high production, since it gave a semi-automatic operating cycle.

You may have an entirely different grinding problem. Do you require high precision, large production, fine finishes . . . or reduced costs? Our engineers will be glad to make production estimates and tooling suggestions on the basis of your blue prints.

82

ANDIS TOOL COMPANY 10 E. SIXTH STREET WAYNESBORO, PA.

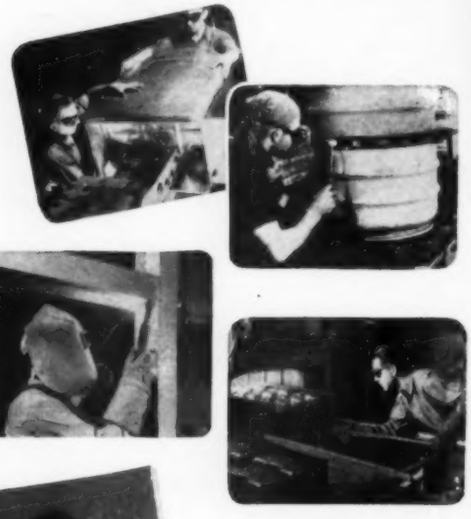
Help your designers and shopmen

Increase production, cut production costs by using aluminum to the best advantage in your products.

Alcoa's technical library of 11 sound movies and 8 booklets is available to show your designers, engineers and production men the best ways to work with aluminum. Each film and book was produced by an Alcoa specialist. They're full of practical, how-to-do-it information.

Borrow or buy the movies in either 16-mm or 35-mm sizes to show on your sound projector. All 8 booklets are free. Ask the nearby Alcoa sales office to lend you the films, supply you with the booklets you need. Or write ALUMINUM COMPANY OF AMERICA, 2107 Gulf Bldg., Pittsburgh 19, Pa.

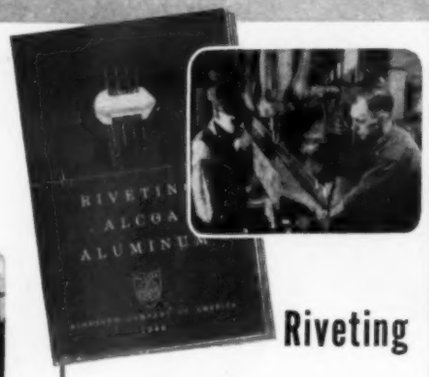
Welding and Brazing



Booklet: Welding and Brazing Alcoa Aluminum, 128 pages.

Movies: Arc Welding, 10 min. Resistance Welding, 12 min. Torch Welding, 17 min. How to Braze Aluminum, 7 min.

Riveting



Booklet: Riveting Alcoa Aluminum, 54 pages.

Movie: How to Rivet Aluminum, 26 min.

Casting

Booklet: Casting Alcoa Alloys, 142 pages.

Machining

Booklets: Machining Alcoa Aluminum and Its Alloys, 66 pages. Alcoa Aluminum in Automatic Screw Machines, 96 pages.

Movie: How to Machine Aluminum, 32 min.

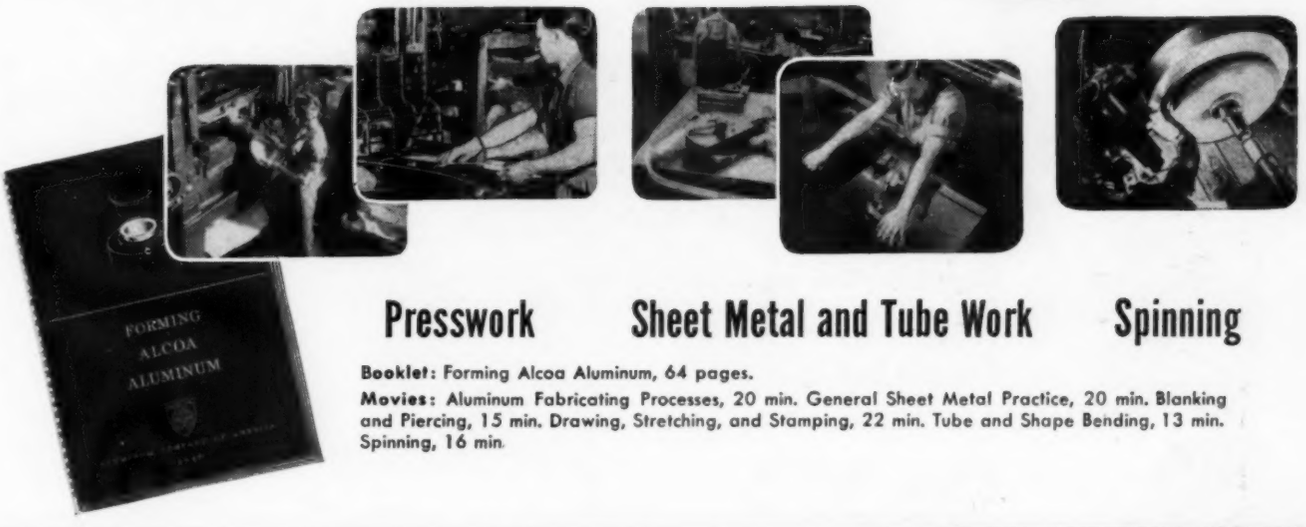
ALCOA

ALUMINUM

ALCOA

work with Aluminum

USE ALCOA'S TECHNICAL LIBRARY OF BOOKS AND MOVIES

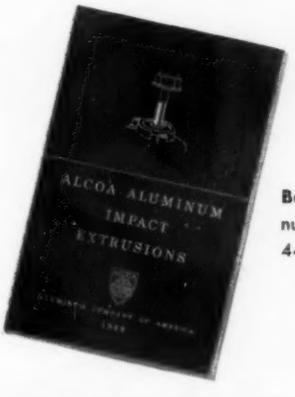


Presswork Sheet Metal and Tube Work Spinning

Booklet: Forming Alcoa Aluminum, 64 pages.

Movies: Aluminum Fabricating Processes, 20 min. General Sheet Metal Practice, 20 min. Blanking and Piercing, 15 min. Drawing, Stretching, and Stamping, 22 min. Tube and Shape Bending, 13 min. Spinning, 16 min.

Impact Extrusions



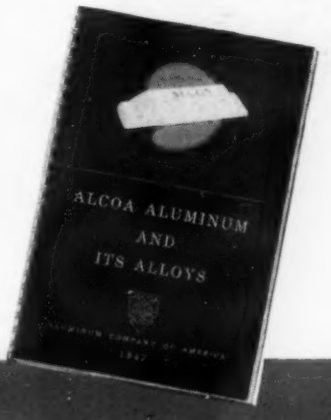
Booklet: Alcoa Aluminum Impact Extrusions, 44 pages.

Finishing

Booklet: Finishes for Alcoa Aluminum, 64 pages.

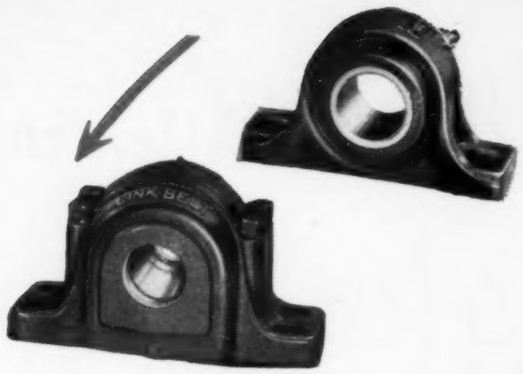
Alcoa Aluminum and Its Alloys

Contains fundamental fabricating information plus tabular data on the chemical and physical properties of aluminum, 155 pages.

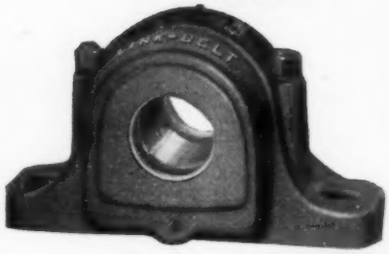


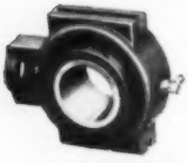
FIRST IN ALUMINUM

WITH LINK-BELT BALL AND ROLLER BEARINGS *It's*



Operation "O.K."

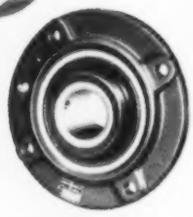




Users everywhere are putting their big "O.K." on the operation of Link-Belt Ball and Roller Bearings. And they report smoother operation of machines equipped with these dependable, precision-built bearing units.

There's a complete line—mounted and unmounted—from which to choose the bearing to fit your job.

Our experienced engineers will be glad to help solve your bearing problems. Once you install Link-Belt Ball and Roller Bearings, you too will enthusiastically say, "Operation O.K.".



11.148

SEND FOR CATALOGS

LINK-BELT COMPANY

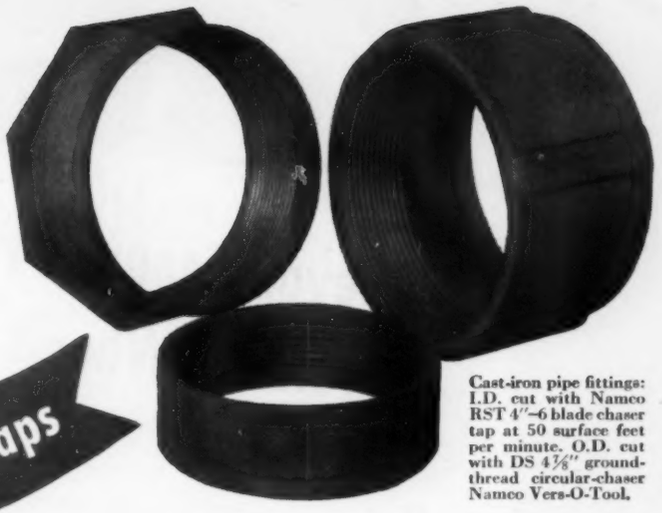
519 N. Holmes Ave.
Indianapolis 6, Indiana
Stocks in Principal Trading Areas

LINK-BELT BALL AND ROLLER BEARINGS

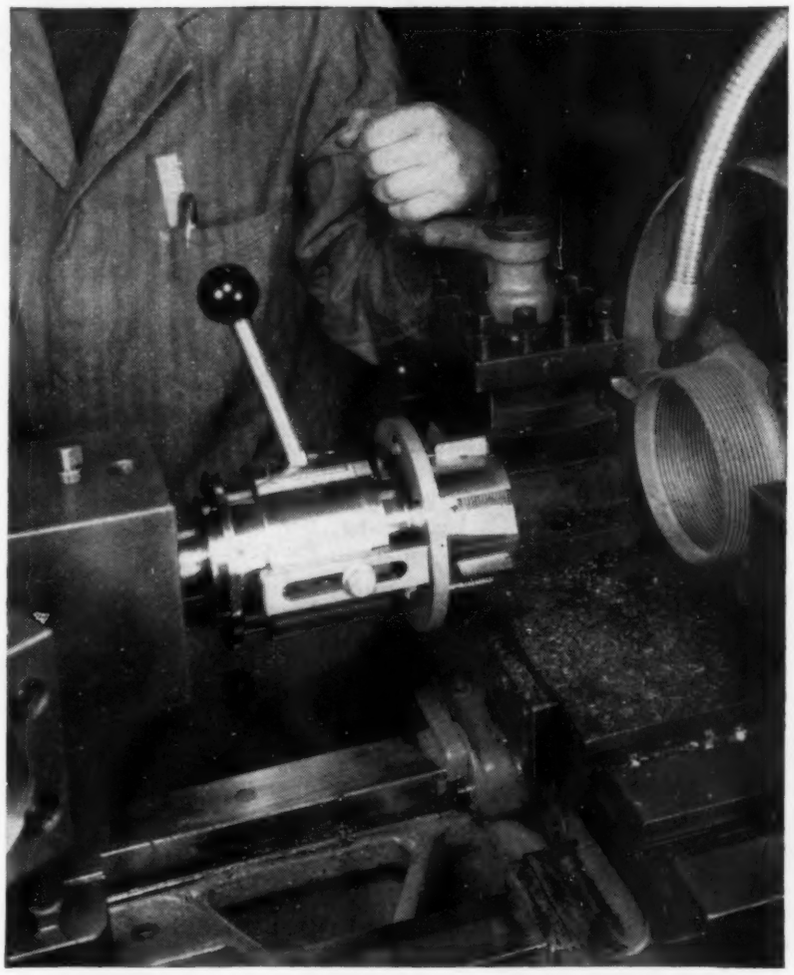
PRECISION THREADING

FAST!

with NAMCO RST collapsible taps



Cast-iron pipe fittings: I.D. cut with Namco RST 4"–6 blade chaser tap at 50 surface feet per minute. O.D. cut with DS 4⅞" ground-thread circular-chaser Namco Vers-O-Tool.



IT'S ACCURATE—The Namco RST Collapsible Tap has a minimum of parts; fewer to adjust and fewer to wear. Compact construction and unique core piece design insure rigid chaser support—for uniform, precision threads.

IT'S FAST—Quick (trigger) positive collapsing at the end of a cut is a feature of the Namco design. Three convenient means of quick collapsing and resetting provide fast operation on all horizontal and vertical machines.

IT'S VERSATILE—The same Namco RST Head is applicable to both stationary and revolving spindle machines. (For revolving spindle, merely remove handle and replace with solid plate.)

IT'S SIMPLE—One screw and collar adjusts all chasers simultaneously to fine diametric adjustment.

★ ★ ★

RST Collapsible Taps are equipped with blade-type chasers for straight or taper threads in sizes 1" to 3½" and with circular ground chasers from 3½" to 5" (3" to 4" pipe sizes). Both types are hardened and ground throughout. Write for catalog and prices.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

Norton Announces . . .

A Revolutionary Process for Making Grinding Wheels Better . . . and Faster

PRECISE CONTROL is the keynote of the new Norton process for making vitrified grinding wheels—precision mixing, precision molding, precision electric burning. And precision in manufacture means a precision product.

Precise Size

Grinding wheels made by this new Norton process are dimensionally accurate within thousandths of an inch—machine readjustments when new wheels are mounted are practically never necessary.

Precise Balance

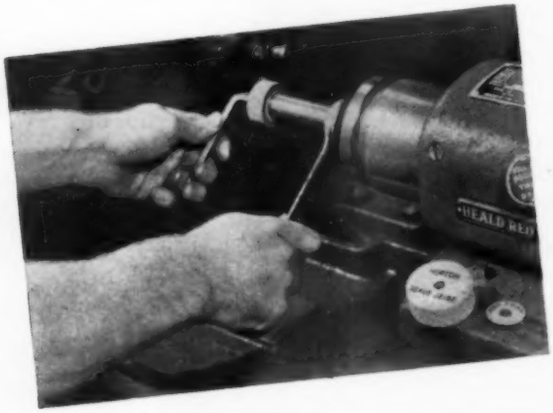
Because of precision molding and precision burning, precise balance is inherent in the wheels—it's there to start with and it stays as the wheels wear down.

Precise Grinding Action

The control methods of the new process have brought a new uniformity to grinding action not only throughout the life of each individual wheel, but from wheel to wheel and from lot to lot.

Faster Service

Not only does the new process make wheels *better* but also *faster*. Burning time alone has been cut from a matter of days to mere hours. Many customers who have been using wheels made in the pilot plant are already aware of the improved service that has been made possible by the revolutionary process.



Slip off the old wheel, slip on the new and start grinding—no machine readjustments are necessary, no changing of feeds or speeds because grinding action is different. Wheels made by the new Norton process are *really uniform*—both in dimensions and in grinding action.

NORTON ABRASIVES

Abrasives • Grinding Wheels • Grinding and Lapping Machines • Refractories • Porous Mediums • Non-slip Floors • Norbide Products • Labeling Machines

A Vast, New Plant to House the New Process

FIVE ACRES of floor space—the largest building in the world for making grinding wheels—that's the new Plant 7 of Norton Company. It was especially designed to house the new grinding wheel manufacturing process envisioned by board chairman, George N. Jeppson, and perfected by Norton development engineers.

$4,300,000 Investment

When this new process had been proved both in theory and by the very successful operation of a pilot plant, Norton was ready to invest millions of dollars in Mr. Jeppson's revolutionary idea. Ground was broken in April 1947 for this mammoth building—602 feet long and 320 feet wide.

Straight Line Production

The new process lends itself ideally to straight line production and maximum use has been made of this in the new building. Abrasive grain and bond are brought into one end of the building and the various production steps take place one after another—including a radically new and continuous electric firing process.

Ten Million Wheels Already Made

The complete success of the new process has been definitely proved by the ten million grinding wheels already made by it—first in the pilot plant and in recent months in the new building. Many customers, especially in the field of internal grinding, have been using the wheels and are enthusiastic about them. In both dimensional accuracy and uniformity of grinding action they are far beyond anything previously available in a grinding wheel.

Airplane View of New Norton Plant 7

A SERVICEABLE, STURDY, *ready made* LINE

Fig. 732 Pat. & Pat's Pend. "Hallowell" Work-Bench of Steel—drawer is extra.

Fig. 847. "Hallowell" Work-Bench of Steel—*without* end and back pieces, drawer and lower shelf.

Fig. 926. "Hallowell" Work-Bench of Steel—with high-grade laminated wood top.

HALLOWELL

WORK BENCHES OF STEEL

"Hallowell" *ready-made* Work-Benches of Steel are the ideal modern addition to your shop. "Hallowell" Benches have smooth, long wearing steel tops; are also available with laminated wood tops; or steel tops covered with "Tempered Presdwood." Made in 4 standard heights, 3 widths, and 7 lengths; can be arranged as individual units, or can easily be re-arranged to form a continuous work-bench—*not practicable* with nailed together wooden benches; the "Hallowell" does not require costly bolting to the floor.

Write us for the name and address of your nearest "Hallowell" Industrial Distributor and your copy of the "Hallowell" Catalog.

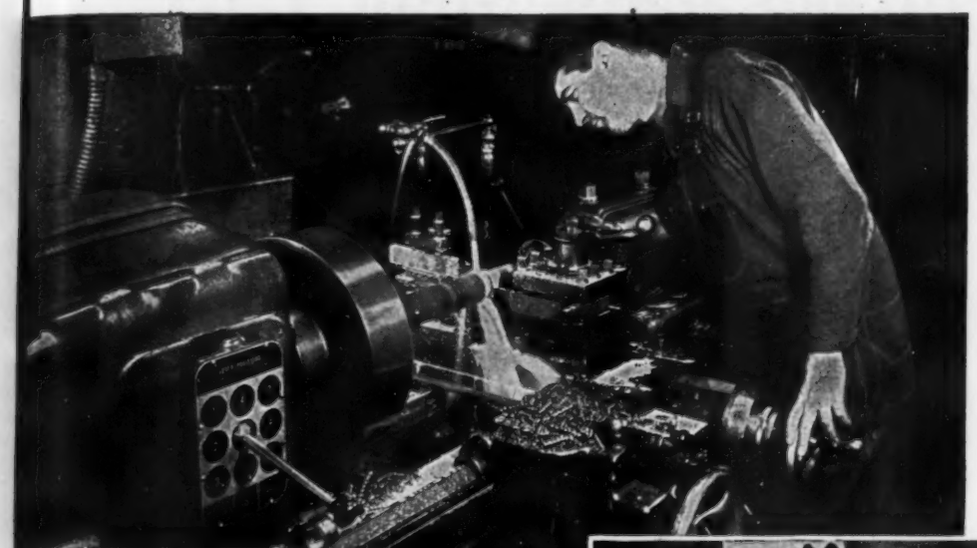
OVER 45 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

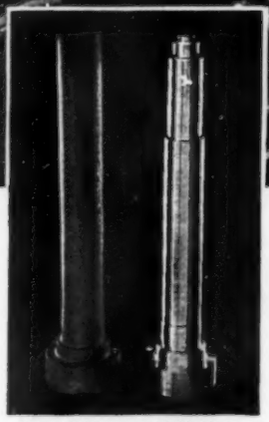
JENKINTOWN, PENNA. BOX 4

BRANCHES: CHICAGO DETROIT INDIANAPOLIS SAN FRANCISCO ST. LOUIS

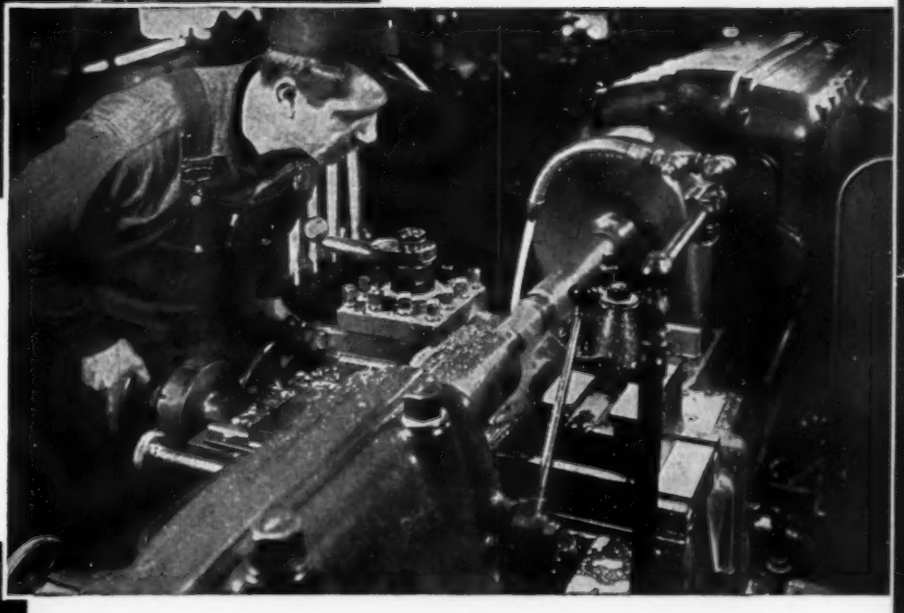
MINUTES INTO PROFITS...



20-In. "AMERICAN" Multi-Production Lathe, turning elevating pinion shafts from rough forgings for 40 M.M. anti-aircraft guns.



THIS to THIS in 18 minutes



This is no stunt! It's a steady production job day in and day out. Total floor to floor time, **18** minutes. Cutting speed, 175'. Feed, .015". Maximum depth of cut, 3/8". Material, S.A.E. 4640 steel—heat-treated.

PRODUCTION EQUIPMENT

Front and rear tool holders. Automatic length stops. Direct reading cross feed dials with indicating clips. Built-in roller bearing tailstock center. This is the kind of performance that transforms minutes into profits.

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

Lathes and Radial Drills

BULLARD MAN-AU-TROL V. T. L. AUTOMATICALLY MACHINES DIESEL WHEELS 3 TIMES FASTER

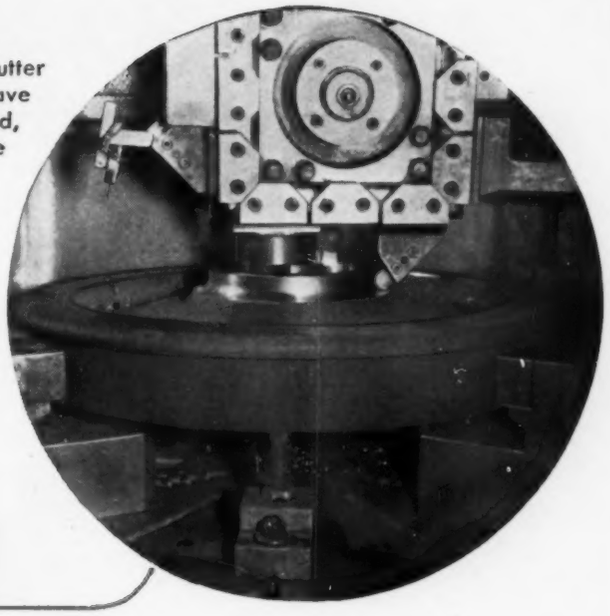
This BULLARD 54" Man-Au-Trol V. T. L. in the B. and M. R. R. shops at North Billerica, Mass., machines a wrought steel Diesel locomotive wheel in less than an hour, three times faster than the previous method. Man-Au-Trol Cuts Time between Cuts and Time on Cuts.

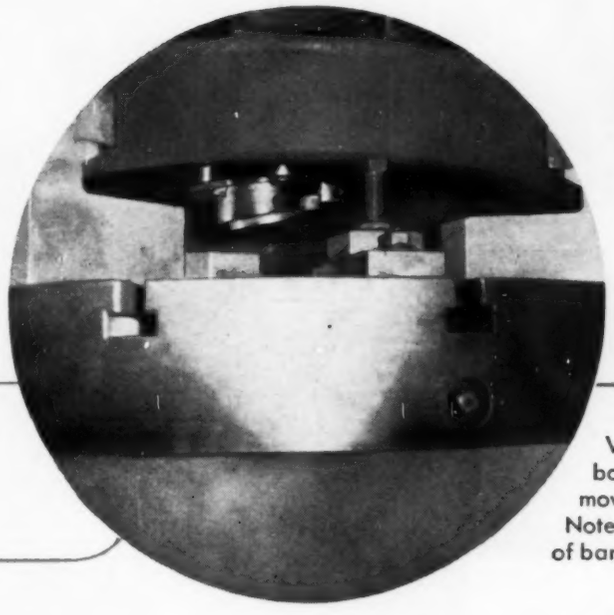
Your investigation of BULLARD Man - Au - Trol for your work will convince you that its combination of versatility, accuracy, productivity and cost-cutting ability is hard to beat. Write for Bulletin MAV-G-1 today. The BULLARD COMPANY, Bridgeport 2, Conn.

BULLARD MAN-AU-TROL MASTER OF THE MACHINE

BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

Here the boring tool and turning cutter on B. and M.'s Man-Au-Trol V. T. L. have nearly finished their cuts. When finished, the head moves to the right to straddle face the hub.

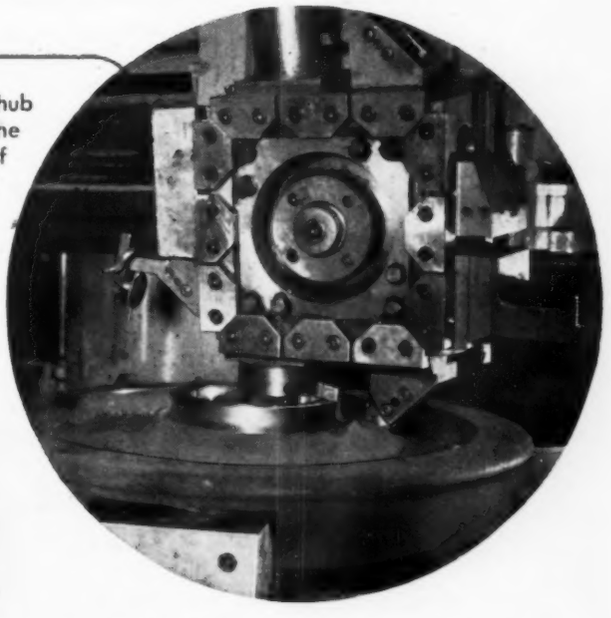


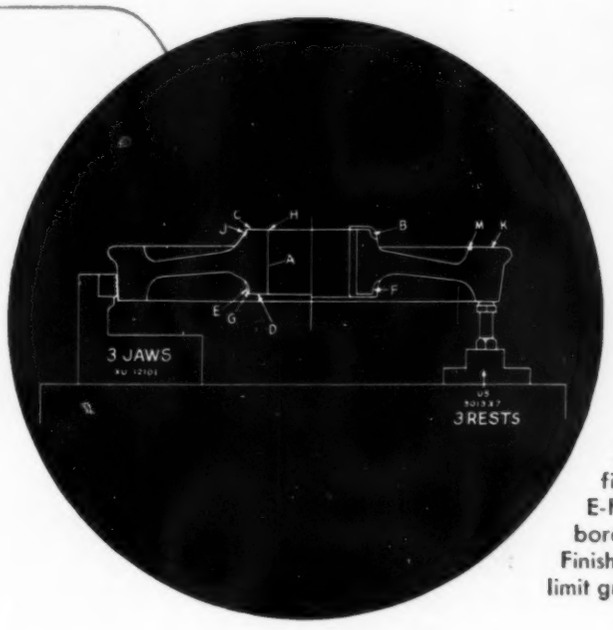


View from underside of wheel showing boring tool at end of cut, ready to move to the right to take straddle cut. Note lower straddle cutter on right side of bar.

How Diesel Locomotive Wheels Are Machined On 54" BULLARD MAN-AU-TROL V. T. L.

Here you see the finish of the hub straddle facing operation. Now the head and bar move left to center of bore and rise to index position for next operation.





Complete cycle of machining operations on B. and M. Diesel car wheel: Bore A; Turn Radius B; Straddle face C-D; Semi-finish bore A; Semi-finish E-F; Cut 20° angle, upper F; Finish turn E-F; Cut 45° angle G to D; Finish face D; Finish bore A; Chamfer bore H; Finish ¾" rad. B-J; Finish 13.000" dia. B-J; Face rim K; Cut wear limit groove M.

WINTER BROTHERS TAPS ARE DEPENDABLE

COORDINATED RESEARCH

Dependability is built into Winter Taps by a carefully coordinated research program. This includes research into raw materials, heat treatment methods, and performance records in the laboratory and in the field. This interlocking research program keeps Winter Brothers abreast of the latest developments in the art of metal cutting. It assures you better performance and longer tool life when you specify Winter Taps.

Always at Your Service

YOUR LOCAL DISTRIBUTOR carries a complete stock of Winter Taps on his shelves — as close to your tapping problems as the telephone on your desk.

Winter Chip Driver Taps are designed for fast operation in tough alloys. They are part of Winter's complete line of carbon and high speed steel taps and dies.

Winter Brothers COMPANY

ROCHESTER, MICHIGAN, U.S.A. • Distributors in Principal Cities • A Division of the National Twist Drill and Tool Company • Branch Stores: New York, Detroit, Chicago, San Francisco

WINTER

PERFORMANCE IS BUILT INTO NATIONAL METAL CUTTING TOOLS

FIELD ENGINEERING SERVICE

National Heavy Duty Milling Cutters are designed for heavy cuts where a substantial amount of stock must be removed. Other National metal cutting tools include twist drills, reamers, counterbores, end mills, and hobs.

Long and productive tool life depends as much on the way tools are used as on their quality and design. To help users get the most out of their metal cutting tools, National maintains a complete field engineering service. National engineers have the wide experience of the entire National organization to call on. You are invited to call on your National field engineer the next time you run into a troublesome metal cutting problem.

Call Your Distributor

LEADING DISTRIBUTORS EVERYWHERE offer complete stocks of NATIONAL Cutting Tools. Call them for cutting tools or any other staple industrial product.

NATIONAL TWIST DRILL AND TOOL COMPANY

ROCHESTER, MICHIGAN, U. S. A. Tap and Die Division—Winter Bros. Co.

Distributors in Principal Cities • Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco

Haunted by high grinding costs?

High grinding costs can be lurking unseen behind any of your grinding operations.

Often, only extensive training and experience in grinding-cost problems will rout them out for you. That's why it would pay you to let Peninsular engineers conduct your witch-hunt.

You see, they know where to look for excess grinding costs—and they look *everywhere!* Their skill is in their ability to examine *every* factor of your operations, and not miss a single possibility.

They start with a thorough examination and analysis of your particular grinding problems, your machines, your methods, the materials you grind.

Their recommendations cover not only wheel specifications, but ideal work speeds, wheel speeds, machine adjustments. Their analysis and their recommendations will include every factor that can increase your wheel life and stock removal, improve your finishes, and decrease dressing time and expense.

If anyone can cut your grinding costs, these experienced Peninsular engineers can. And the chances are overwhelming that your grinding costs *can be cut.*

When may a Peninsular engineer call on you?

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Buffalo, Cleveland, Pittsburgh, Houston, St. Louis, Cincinnati.

PENINSULAR

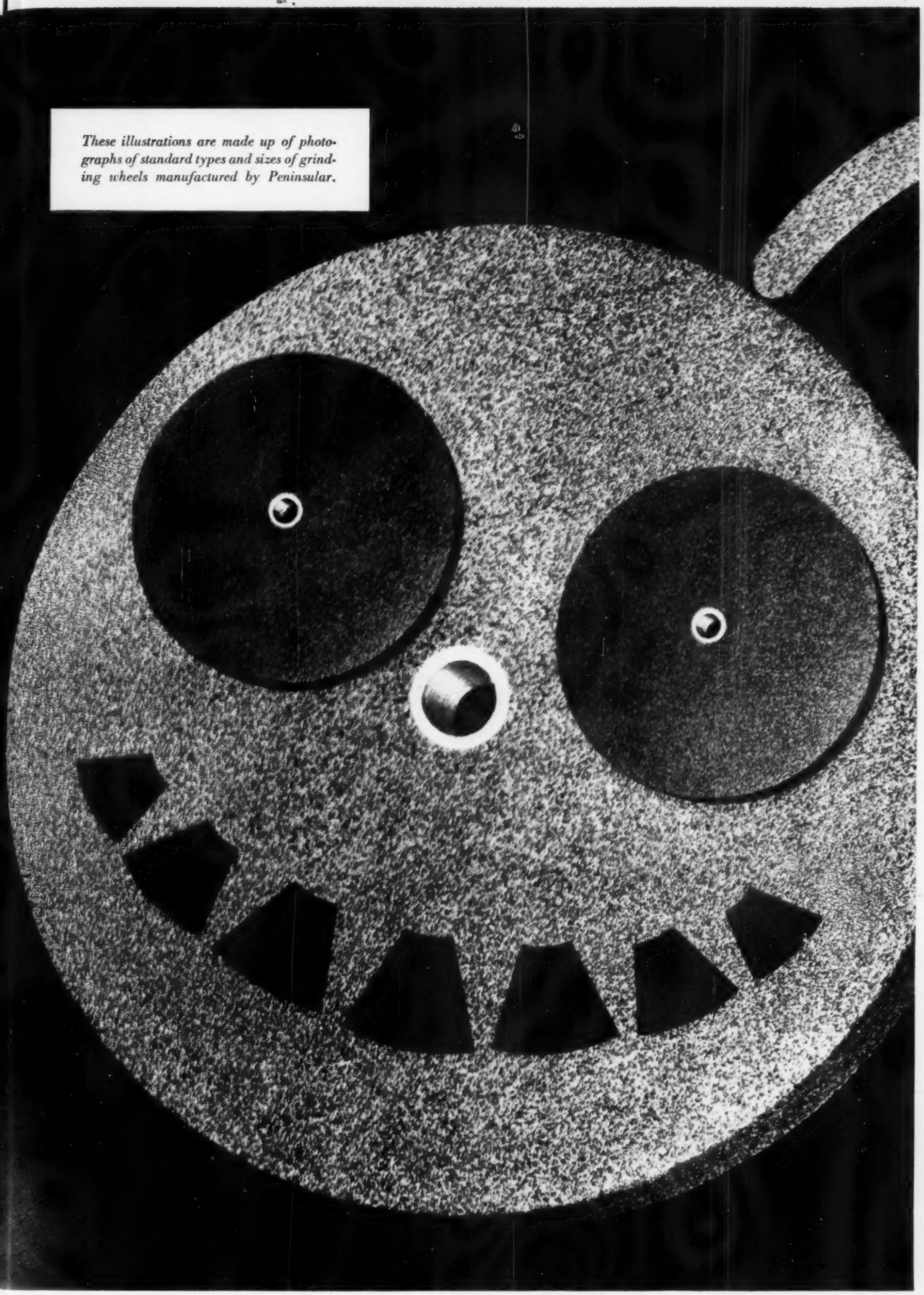
INDIVIDUALLY PENINSULAR *ENGINEERED*

GRINDING WHEELS

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS

These illustrations are made up of photographs of standard types and sizes of grinding wheels manufactured by Peninsular.



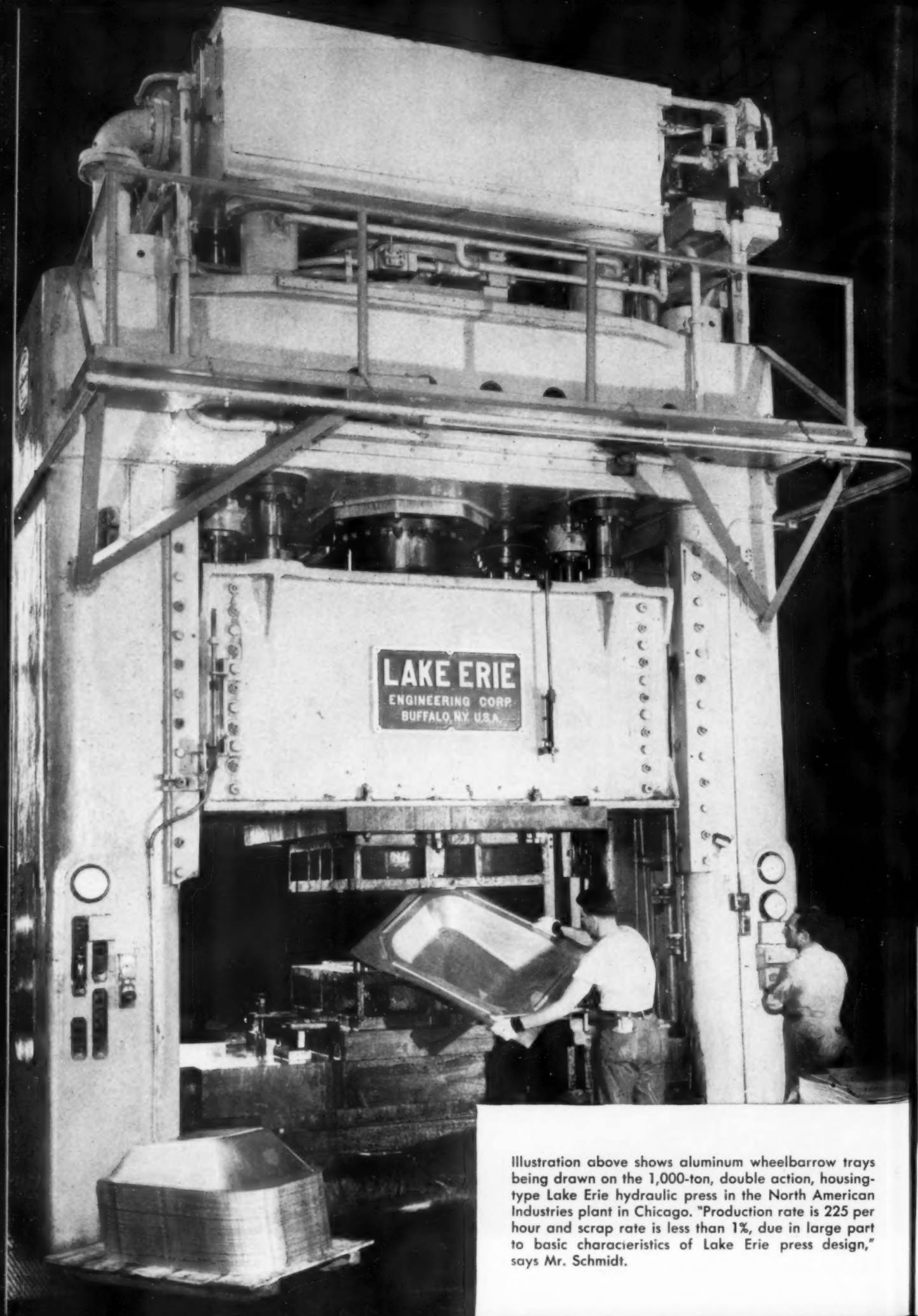


Illustration above shows aluminum wheelbarrow trays being drawn on the 1,000-ton, double action, housing-type Lake Erie hydraulic press in the North American Industries plant in Chicago. "Production rate is 225 per hour and scrap rate is less than 1%, due in large part to basic characteristics of Lake Erie press design," says Mr. Schmidt.

NORTH AMERICAN INDUSTRIES
deep draws 225 large pieces per hour
on LAKE ERIE Hydraulic Press

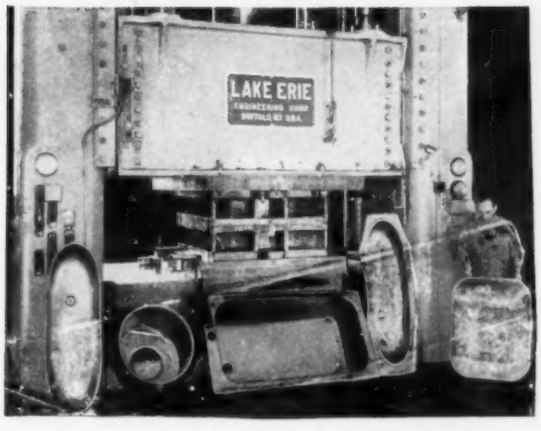
LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

"Rapid approach and return strokes combined with fast drawing speed even at maximum tonnage makes high production rate possible,"
Says **THUR SCHMIDT,** General Manager

The one-piece [illegible] shown above are drawn cold in a single operation to a depth of 15" from 14 gage steel. "Consistent success has been achieved with both hot-rolled and cold-rolled mild steel, aluminum and various alloys of stainless, with the Lake Erie press," says Mr. Schmidt.

If you are searching for ways to step up production, improve quality or lower your costs...the accomplishments of this 1,000-ton Lake Erie Hydraulic Press are worth contemplating. It does with ease and precision, in a single fast action, jobs that are either impossible or require multiple operations by other methods. Many top-flight manufacturers are already using this Lake Erie design and can tell you plenty about its speed and versatility. Space doesn't permit us to list the users or complete specifications of this design which is available in capacities of 400-tons and up. But we'll be glad to forward any data you desire if you care to look into the matter further.

LAKE ERIE ENGINEERING CORP.
MANUFACTURERS OF
HYDRAULIC PRESSES AND SPECIAL MACHINERY
General Offices and Plant:
807 Woodward Avenue, Buffalo 17, New York
DISTRICT OFFICES IN NEW YORK, CHICAGO AND DETROIT
Representatives in Other Principal Cities in the United States and Foreign Countries



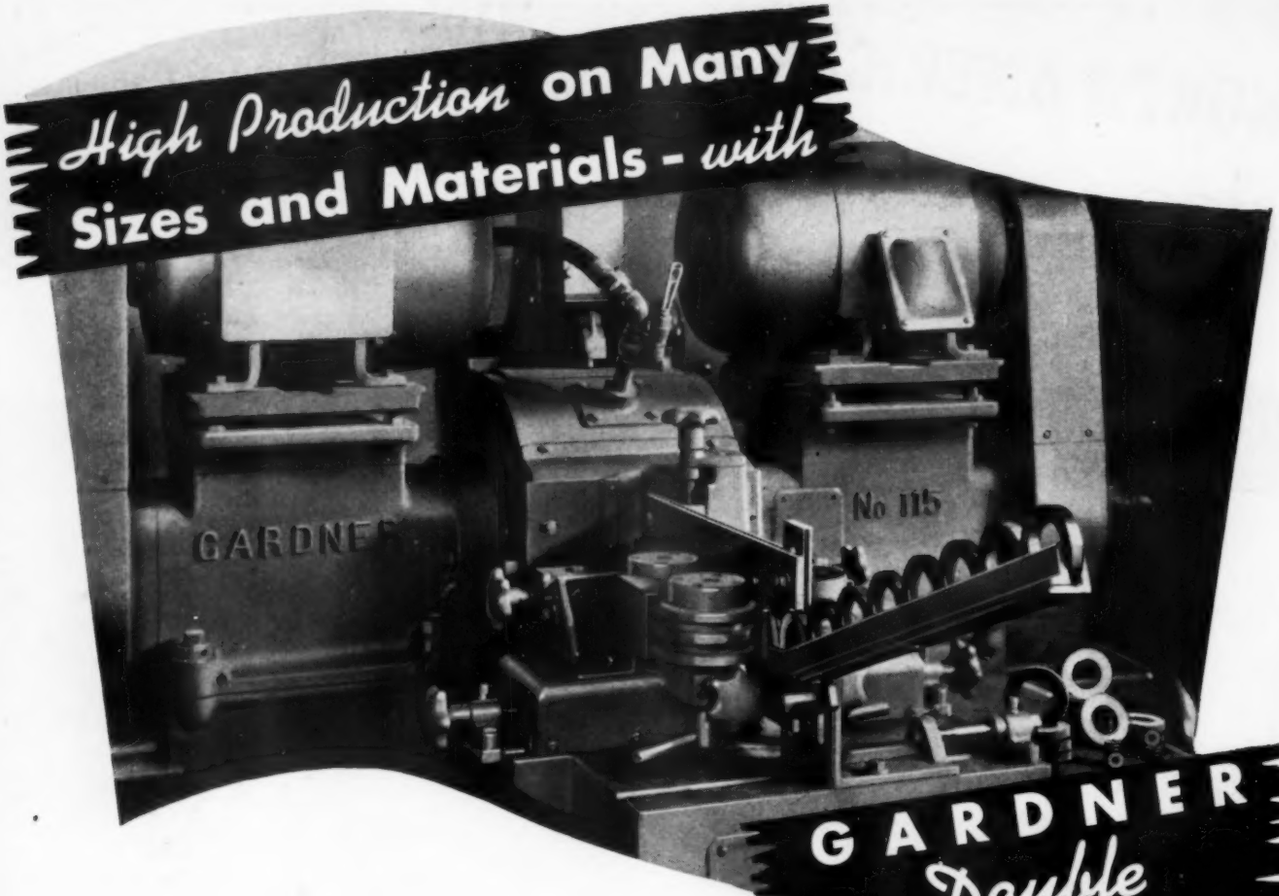
A wide-range of products, some of which are shown at left, are drawn on this versatile Lake Erie press. Runs of as high as 60,000 pieces have gone through the press. "An important feature of the press," says Mr. Schmidt, "is the ease with which adjustments for stroke, tonnage and gage variation may be made when necessary during the course of production runs."

★

The North American Industries wheelbarrow at right is light, strong, attractive and perfectly balanced.

LEADING MANUFACTURER OF HYDRAULIC PRESSES—ALL SIZES AND TYPES—METAL WORKING...PLASTICS MOLDING
FORGING . . . METAL EXTRUSION . . . PROCESSING . . . RUBBER VULCANIZING . . . STEREOTYPING . . . SPECIAL PURPOSE

High Production on Many Sizes and Materials - *with*



GARDNER *Double* GRINDERS

THE versatile machine shown above is equipped with a feed-thru type fixture which will handle large-volume production, on many sizes of parts, and many kinds of materials. For example, several sizes of hard rubber washers are loaded into an inclined trough, from which a V-belt feeder carries them through the machine in a continuous stream. Opposed abrasive wheels grind TWO parallel sides with ONE pass.

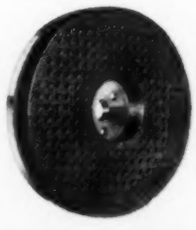
Our engineers will be glad to explain how a GARDNER *Double* GRINDER will give you high production on a wide range of sizes of hard-to-handle parts, and in many different materials — while grinding within close tolerances, and at high rates of production.

Write us about your parallel-surfacing needs—or send for our DOUBLE Grinder Bulletin.

WORK DATA

Part *Washers*
Material *Hard Rubber*
Operation *Grind Two Sides*
Tolerances *.001" to .002" Parallel; .003" Uniformity*
Stock Removal *.030" Maximum Overall*
Production *25 to 30 Pieces Per Minute*
Feed *Semi-Automatic "Feed-thru" Fixture*
Machine *No. 115-18" Gardner Double Grinder*

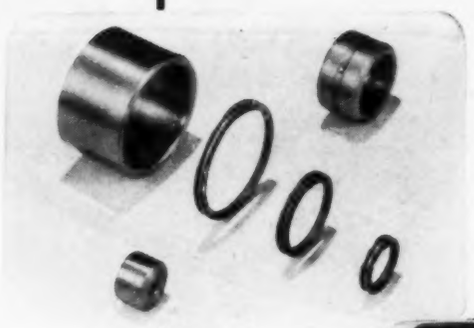
Use Modern GARDNER WIRE-LOKT Abrasives on YOUR Disc Grinders!



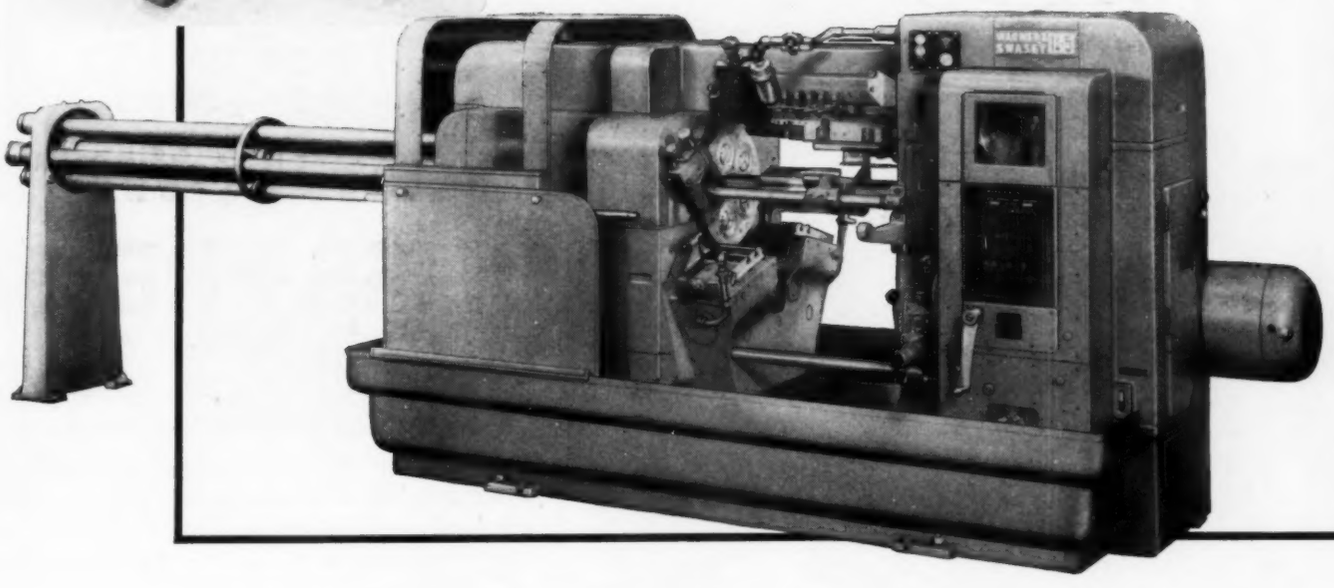
GARDNER-GRIND YOUR *Flat* SURFACES

GARDNER MACHINE COMPANY

410 East Gardner Street . . . . Beloit, Wisconsin, U.S.A.



How to keep Selling Prices Down in the face of Higher Costs?



The Orange Roller Bearing Company finds answer in a Multiple Spindle CAMLESS Automatic

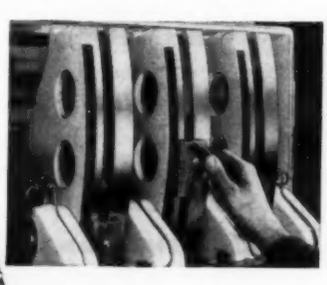
THE Orange Roller Bearing Co., Inc., Orange, N. J. makes roller bearings and allied products. They want to maintain price levels as low as possible.

But increased costs have upped break-even point on volume to double that of prewar days. Long runs, essential for economical operation on existing machines would be offset by large, costly inventories.

The unique advantages of a Warner & Swasey Camless Automatic offered a solution.

The Camless Warner & Swasey 5-Spindle Automatic made short and medium runs practical and economical. The cost of cams was eliminated, the setup changes were simplified and down-time greatly reduced. The flexibility of the Warner & Swasey 5-Spindle Automatic solved the problem of smaller inventory.

Warner & Swasey 5-Spindle *Camless* Automatics are available as 1¾"-5" and 2¼"-5" Bar Machines, and 6" Chuckers. To learn what they can do for you, ask your nearest Warner & Swasey office or write—



Patented Quick-Set Quadrant quickly adjusts to any feed stroke between 0 and 5 inches.

to set up a Warner & Swasey CAMLESS Automatic!

WARNER & SWASEY
Cleveland

Turret Lathes, Multiple & Single Spindle Automatics, Precision Tapping and Threading Machines

Some of the many Stewart-Warner products that come off Bliss Presses.

...and at Stewart-Warner 318 BLISS PRESSES

Just picture the range of different stamping problems involved in producing such a diversified line of products as speedometers, radios, lubrication service equipment, industrial gauges, car and aircraft heaters, and hardware. That's a sampling of Stewart-Warner's line. Then consider the variety of types and sizes of presses required.

It's one reason why a high proportion of Stewart-Warner's press equipment is Bliss-Built—high production presses, batteries of inclinables, enclosed presses and coining presses, among others.

Why does Bliss have such acceptance on this and so many other pressed-metal production lines?

Because Bliss' field-trained engineers first analyze a customer's production requirement, then help select the *right press for the job.* At Stewart-Warner, high production presses were recommended for certain large quantity stampings while knuckle joint presses were adapted for sizing and swaging. The result is a steady output of uniformly good stampings produced more economically and efficiently.

Let a Bliss sales engineer help you get the most out of your presses—mechanical or hydraulic. You'll be drawing on a fund of engineering knowledge developed over 90 years. And you'll see why "Bliss" on your press is more than a name—it's a guarantee. Send for him today.

One of a battery of 10 Bliss High Production Presses, with special fixed inclined legs, used for high speed blanking and forming operations in Stewart-Warner's instrument division.

Steel covers for Alemite garage service equipment are pierced and trimmed at rate of 115 per hour in this Bliss 300-ton enclosed press.

E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical & Hydraulic Presses, Rolling Mills, Container Machinery

WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France. SALES OFFICES AT: Detroit, Hastings, Mich.; New York, Rochester, N. Y.; Cleveland, Dayton, Toledo, Salem, Ohio; Philadelphia, Pittsburgh, Pa.; Chicago, Ill.; New Haven, Conn.; Windsor, Ont.

MARQUETTE · BLISS · CONSOLIDATED · TOLEDO ·

BLISS BUILT

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD

What's in
VERMONT
this month?

SUBSTITUTE SET-UPS. Stock removal on internal grinding may prove to be one of the slowest jobs in the shop if substitute set-ups are used. Frequently production departments are obliged to use make-shift arrangements and are expected to turn out work with fine finish and close tolerances—on time!

When substitute set-ups are used for internal grinding two things happen: first, production is slow; second (and probably worse), dust and grit get into the unprotected moving parts and in a short time the machine has to be rebuilt.

Bryant internal grinders are designed to work fast and to close tolerances. Stock can be removed from large parts at the rate of 3 cubic inches per minute. The machines are simple and rigid. Sensitive slides and accurate feedscrews are completely protected so that grit from the wheel or dust from the work cannot ruin the machine.

Bryant builds a complete line of internal grinders to finish holes from .040 inch to 50 inches in diameter. With these machines available, the right set-up can be made for any production or tool room job.

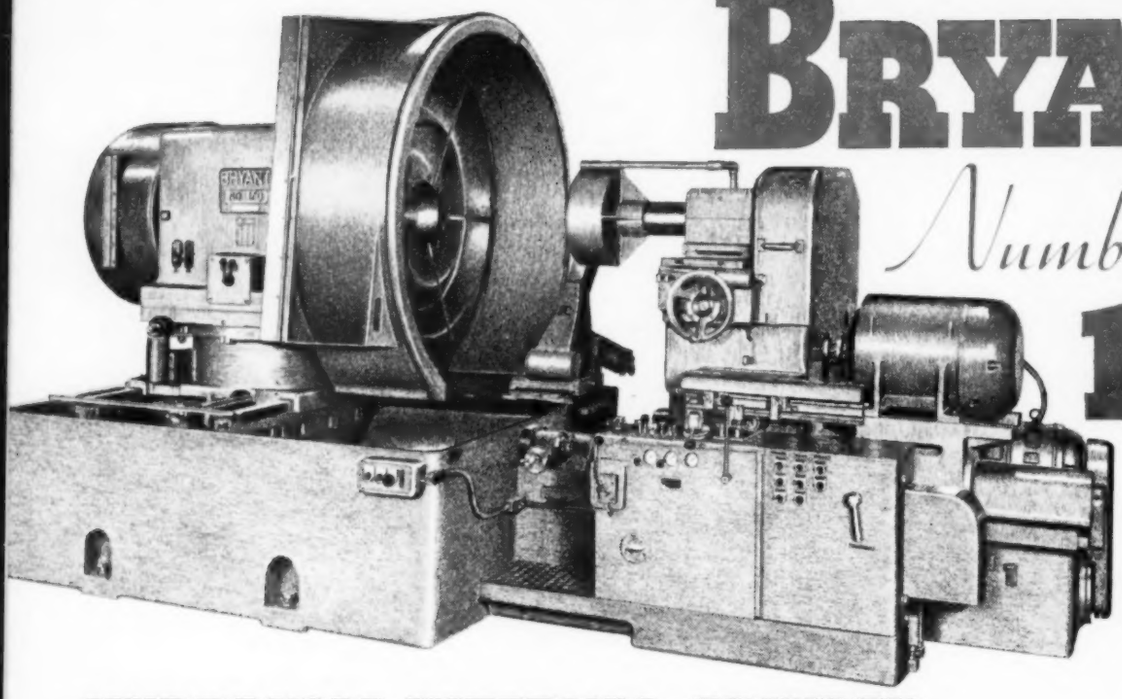
This is an example of how machine tools are designed to fit specific needs and why it is poor economy to make substitute set-ups.

It won't cost to inquire.

Bryant Chucking Grinder Co., Springfield, Vermont, U.S.A.

BRYANT

Number **150**



HYDRAULIC INTERNAL GRINDER

The No. 150 with 60-inch maximum swing is the largest internal grinder in the Bryant line. Other Bryant equipment will grind holes through the complete range down to holes as small as ⅛-inch in diameter. Write to the factory for full information.

SPECIFICATIONS

Total swing	60 inches
Maximum traverse	21 inches
Maximum hole depth	16 inches
Will grind included angle 60°	
R.P.M. of work spindle — 15, 25, 35, and 50 R.P.M.	
Net weight	12 tons
Floor space — 14 feet x 9 feet (with coolant tank)	

SLIDES
Bryant cylindrical steel slide.

WORKHEAD
Anti-friction bearings. 60-inch face plate. 9-inch through hole. 30-inch cross and 20-inch axial adjustment.

WHEELHEAD
Interchangeable quill type, belt driven, anti-friction bearings.

TRAVERSE
Infinitely variable, hydraulically powered.

CROSS FEED
Variable speed, hydraulically operated feedscrew.

BRYANT PORTABLE INTERNAL THREAD GAGE. A fast, accurate, visual way to check threaded parts while still chucked in the machine. Also ideal for inspecting threads in large castings and pieces too heavy to move to the inspection department. Capacity of two models — 7/16" to 1" and 1" to 3". Write for details.

You can *"See the Difference"* with a BRYANT GAGE

It is no longer necessary to "feel for fit" with plug and ring gages when inspecting threads. The Bryant Thread Gage shows, on a dial indicator, whether a thread will assemble properly with its component.

At a glance, anyone can compare threaded parts with a master and tell the whole story immediately — size, presence of burrs, out-of-roundness, accumulated inaccuracies of pitch, lead, diameter and thread form.

It's fast too. The design incorporates three thread segments, two stationary and one movable. The segments are operated by a thumb lever — the part is dropped between the segments — the lever is released, causing immediate contact of segments to threads — a one third turn of the part inspects it all over.

Send samples or drawings for a complete story on how Bryant can save inspection money for you.

Bryant Chucking Grinder Co., Springfield, Vermont, U.S.A.

The New Look IN TANK FABRICATION

ANOTHER NATURAL JOB FOR THE

NIAGARA

Electronic Automatic WELDING MACHINE

NGITUDINAL WELDS AND RCUMFERENCIAL WELDS

finger tip control with infinitely iable speed in either direction uit weld size and tank diameter.

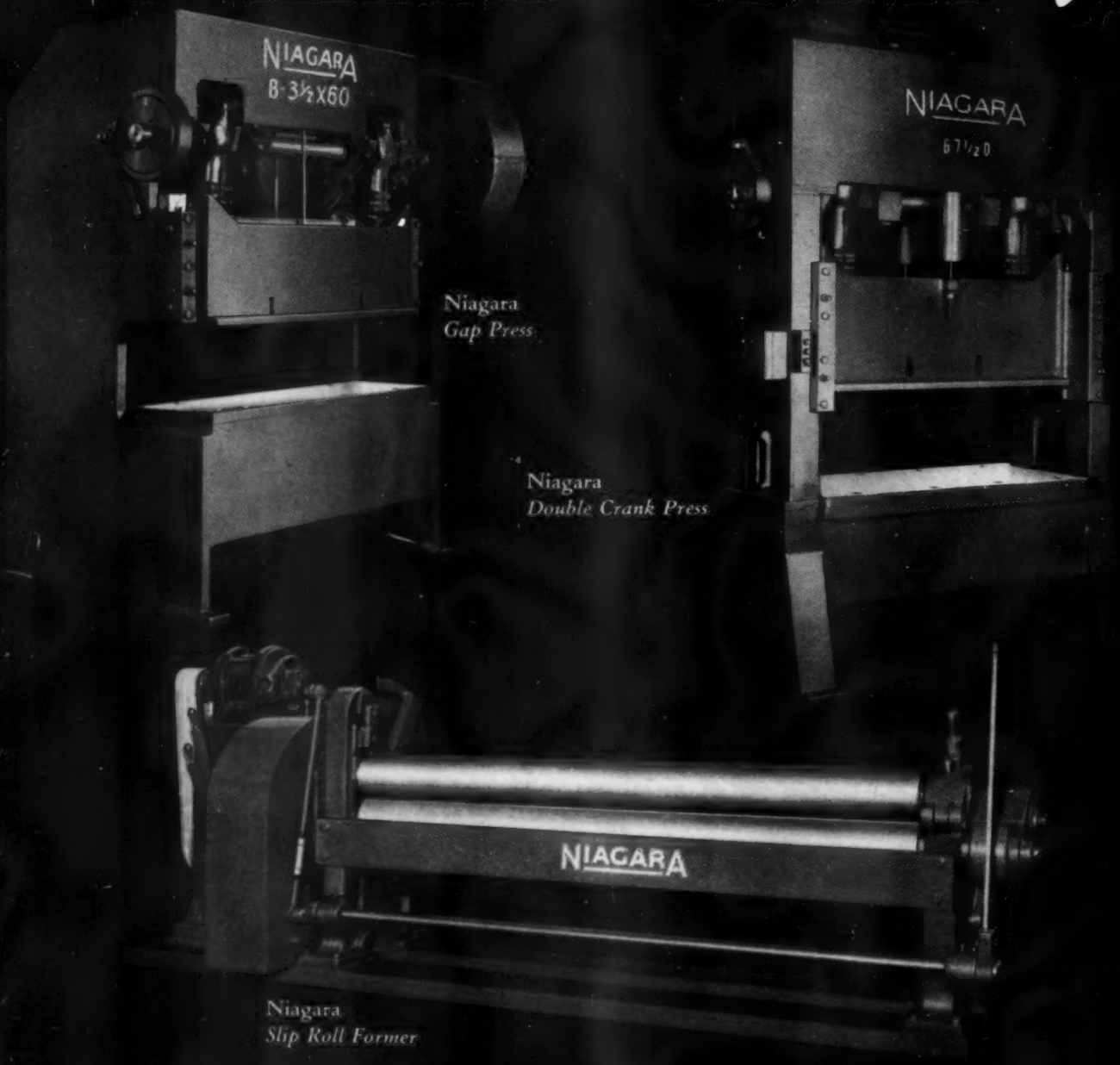
TAKE ADVANTAGE OF

FASTER SET UP . . . Power Elevated Welding Beam is quickly positioned over job.
FASTER WELDING . . . Increased welding current, increased speed.
STRONGER WELDS . . . Deeper penetration of weld.
MORE VERSATILITY . . . Tanks of any diameter, any length.

IAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.
ISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK

NIAGA

PRESSES, SHEARS, M
TINNERS TOOLS *for* S



Niagara
Gap Press

Niagara
Double Crank Press

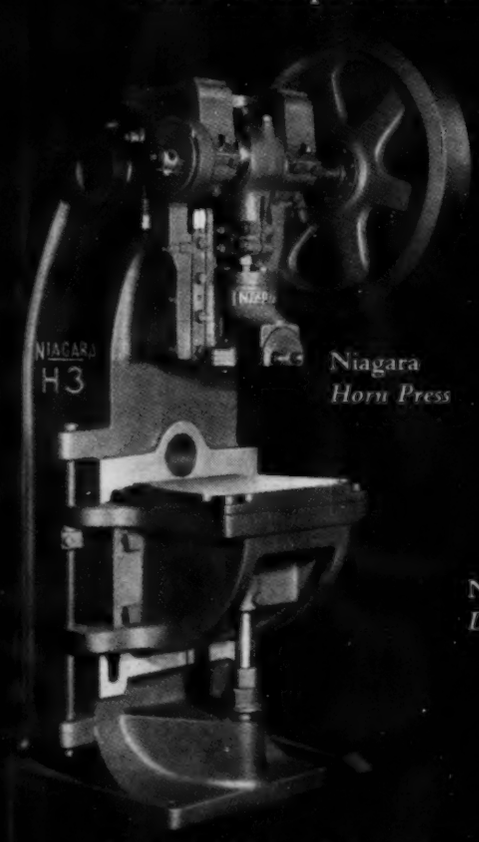
Niagara
Slip Roll Former

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, N. Y.

ARA

S, MACHINES *and*
SHEET METAL WORK

Operations including shearing, blanking, punching, forming, flanging, beading, corrugating, seaming and many others are being done quickly, economically and accurately on Niagara machines. Niagara machines and tinners tools on these pages are just a few of the hundreds of types, sizes and capacities which make Niagara America's most complete line. Write for helpful bulletins.

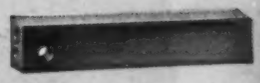


Niagara
Horn Press

Niagara
Double Seamer

Niagara
Ring and Circle Shear

Niagara
Rivet Set and Header



Niagara
Hollow Punch

Niagara
Foot Gap Shear

Niagara
Snips

● **Niagara Electric Combination Machine for burring, turning, wiring, beading, crimping, elbow edging, slitting and other operations.**

District Offices: **Detroit, Cleveland, New York**

ARMSTRONG

ARMSTRONG TOOL HOLDERS

are more efficient

It takes years of development, improvement and practical experience to create and perfect a line of tools. This has been the specialized work of ARMSTRONG, a contribution to machining efficiency which they have carried on continuously for 59 years.

Starting with the Armstrong Principle of inserted cutters in permanent tool shanks that "Saves: all Forging, 70% Grinding and 90% High Speed Steel," they created this unique method of tooling which has changed shop practice in over 96% of the machine shops and tool rooms. And, today, in a specially built plant, equipped with every modern facility and staffed with experts in each phase of tool making, this work goes on.

To you, as a tool user, here is always one safe principle—specify ARMSTRONG Tool HOLDERS for every operation on lathes, planers, slotters and shapers, for turret lathes and screw machines. They are cataloged and stocked by all leading supply houses.

ARMSTRONG BROS. TOOL CO.

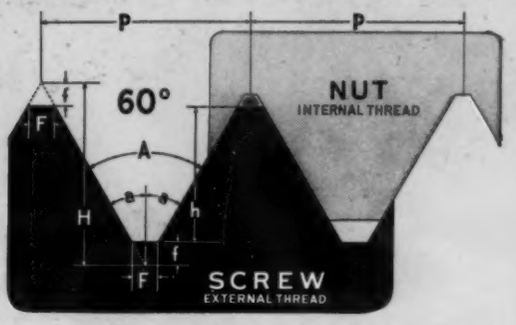
"The Tool Holder People"

5215 W. ARMSTRONG AVE. CHICAGO 30, U.S.A.

Eastern Whse. & Sales Office: 199 Lafayette St., New York 12, N. Y.
Pacific Coast Whse. & Sales Office: 1275 Mission St., San Francisco 3, California

The Science of Making MODERN SCREW THREADS

The basically simple idea of a screw thread has developed into a highly exact science in an age of machines that are held together by billions of threaded parts.

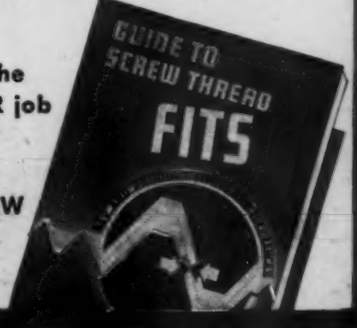


The sketch shows the basic design of the standard American screw thread. It cannot, however, begin to show the intricate problems which are involved in applying this and other thread forms to the varied uses of industry.

To make screw threads suitable for the exacting demands of mass production – modern industry requires three tools – a tap, a die, and a gage. The key word to describe the relationship of these three tools in terms of results is – "FITS". Working to tolerances of ten-thousands of an inch – the screw thread engineer must design and build the tools that will produce the RIGHT "fit" for the job.

Gages are an important member of the GTD "Greenfield" threading team that insures the right "fit" on the modern assembly line. It is only natural that the makers of precision taps and dies should also be qualified to make the gages needed to check them. *Today, when you think of taps and dies – think of gages, too. And when you think of all three – think of GTD "Greenfield", world's headquarters for threading tools.*

To help you get the right "fit" for YOUR job write for a free copy of "GUIDE TO SCREW THREAD FITS"



GTD
GREENFIELD

World's Leading
THREADING TOOLS

When you buy GTD "Greenfield", you get a quality of product that comes from the world's largest, most modern threading tool plant and its research staff of threading engineers – PLUS SERVICE from the leading distributors and GTD "Greenfield's" field men in every industrial center.

GREENFIELD TAP and DIE CORPORATION GREENFIELD, MASSACHUSETTS

Precision THREADING TOOLS

GEOMETRIC

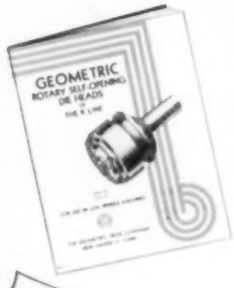
STYLE KD Rotary Self-Opening DIE HEAD

Modern machine work demands unfailing accuracy!

If you're looking for a compact, sturdy tool for fast threading — here's your answer. The Geometric Style KD Rotary Die Head is simple to operate, easy to take apart and reassemble, and capable of long, accurate service under demanding conditions. Its very simplicity makes this tool first choice among thousands of manufacturers for work on live spindle machines, particularly MULTIPLE SPINDLE automatic screw machines. The KD Die Head occupies little space on the machine. Strong solid metal backing at all points of stress insures its durability.

The chasers project beyond the front of the head, allowing close to shoulder threading without removing face plates or substituting projection chasers. This unique Geometric feature plus many others saves time and expense in close to a shoulder work. KD heads are available in six sizes, with a cutting range from 1/16" to 2". *For the complete free story on the many practical advantages of using Geometric's KD Rotary Self-Opening Die Heads just mail the handy coupon today!*

USE COUPON FOR FREE INFORMATIVE BULLETIN NO. K-3



THE GEOMETRIC TOOL COMPANY
7 Valley Street
New Haven 15, Connecticut

Please rush me a copy of Bulletin No. K-3 which describes in detail the many advantages of the Geometric Style KD Rotary Self-Opening Die Head.

*Name*_____

*Firm*_____

*Street*_____

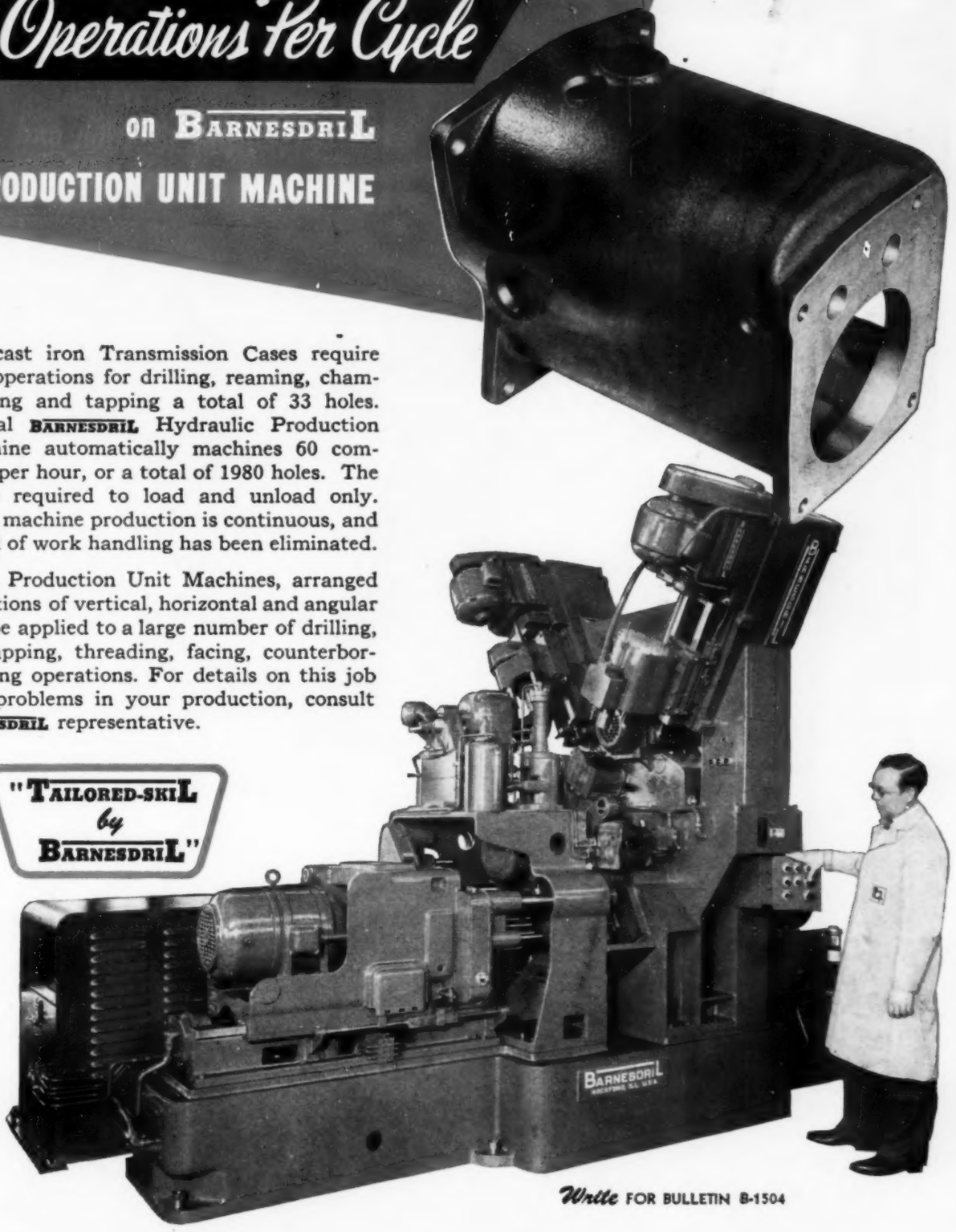
☐ *Bus.* ☐ *Res.*

*City*_____ *Zone*____ *State*_____

THE
GEOMETRIC
TOOL COMPANY • NEW HAVEN 15, CONN.
A Division of Greenfield Tap and Die Corporation

1980 Holes Per Hour
17 Operations Per Cycle

on BARNESDRILL PRODUCTION UNIT MACHINE



These cast iron Transmission Cases require seventeen operations for drilling, reaming, chamfering, facing and tapping a total of 33 holes. This special BARNESDRILL Hydraulic Production Unit Machine automatically machines 60 complete cases per hour, or a total of 1980 holes. The operator is required to load and unload only. As a result, machine production is continuous, and a great deal of work handling has been eliminated.

BARNESDRILL Production Unit Machines, arranged in combinations of vertical, horizontal and angular units, can be applied to a large number of drilling, reaming, tapping, threading, facing, counterboring or milling operations. For details on this job or similar problems in your production, consult your BARNESDRILL representative.

"TAILORED-SKILL by BARNESDRILL"

Write FOR BULLETIN B-1504

BARNES DRILL CO.

830 CHESTNUT STREET ROCKFORD, ILLINOIS U.S.A.

A BUYING GUIDE FOR ABRASIVES

ABRASIVE PROBLEM:
How can Selection and Application be simplified?

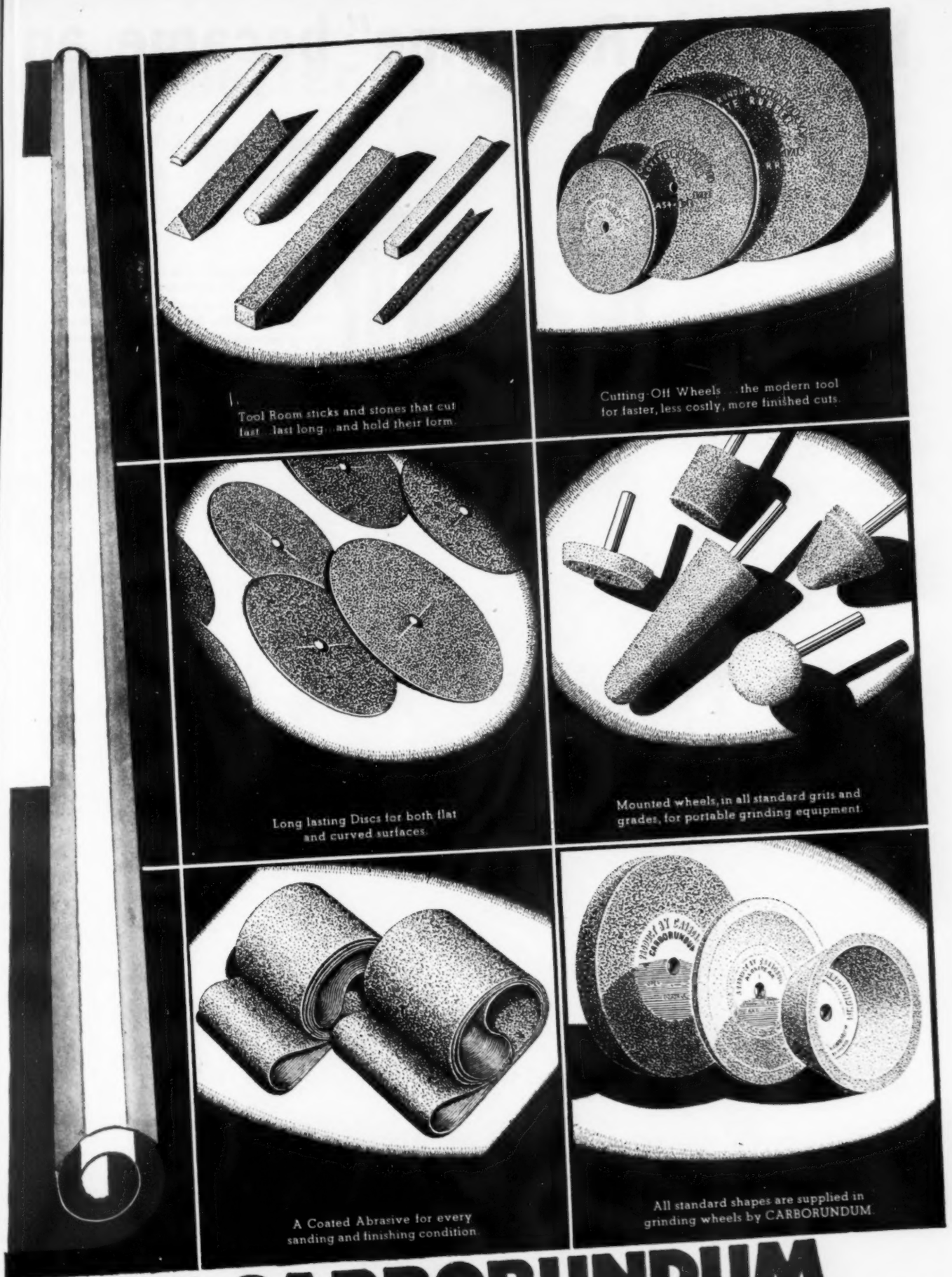
ANSWER BY
CARBORUNDUM
TRADE MARK

these wheels cover a wide range of grinding operations. The smaller number and variety of wheels that need be stocked is only one of several important benefits realized.

Through an extensive program, The Carborundum Company is making selection and application of the best abrasives to use for specific jobs simpler and more efficient. "Series 20" is a timely example. In a relatively narrow pattern of grits and grades, Easier to specify and order, products by CARBORUNDUM, repackaged and relabelled for fast identification, explain another reason for their growing preference by users of abrasive products. The Carborundum Company, Niagara Falls, New York.

"CARBORUNDUM" IS A REGISTERED TRADEMARK WHICH INDICATES MANUFACTURE BY THE CARBORUNDUM COMPANY

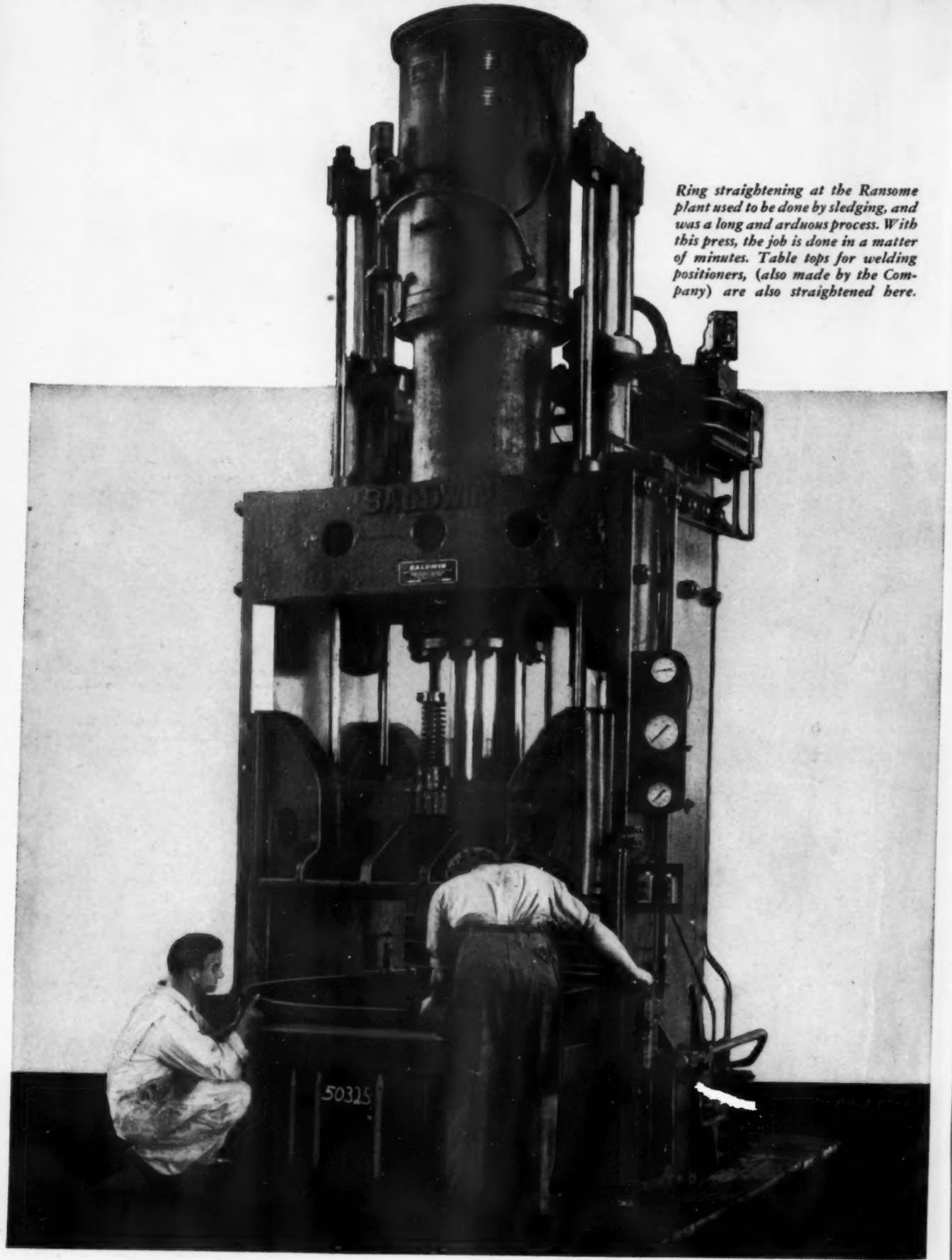
A Good Rule for Good Grinding


Tool Room sticks and stones that cut fast...last long...and hold their form.
Cutting-Off Wheels...the modern tool for faster, less costly, more finished cuts.
Long lasting Discs for both flat and curved surfaces.
Mounted wheels, in all standard grits and grades, for portable grinding equipment.
A Coated Abrasive for every sanding and finishing condition.
All standard shapes are supplied in grinding wheels by CARBORUNDUM.

... CALL IN **CARBORUNDUM** TRADE MARK

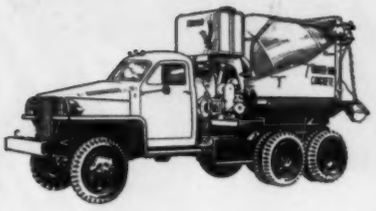
● BONDED ABRASIVES ● COATED ABRASIVES ● ABRASIVE GRAINS AND COMPOUNDS

How the "Ransome" became an

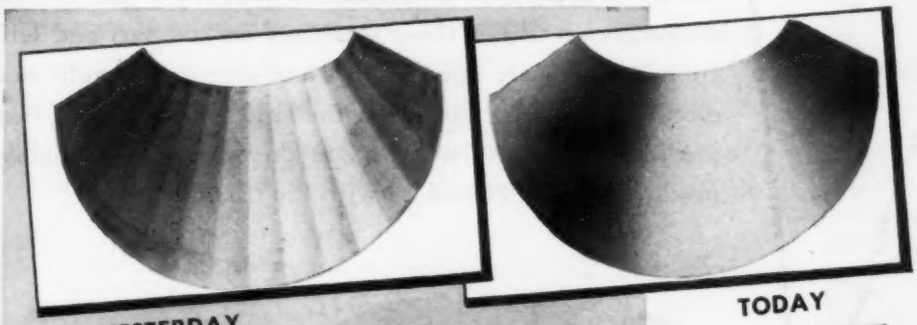


Ring straightening at the Ransome plant used to be done by sledging, and was a long and arduous process. With this press, the job is done in a matter of minutes. Table tops for welding positioners, (also made by the Company) are also straightened here.

even better mixer with BALDWIN HYDRAULIC PRESSES

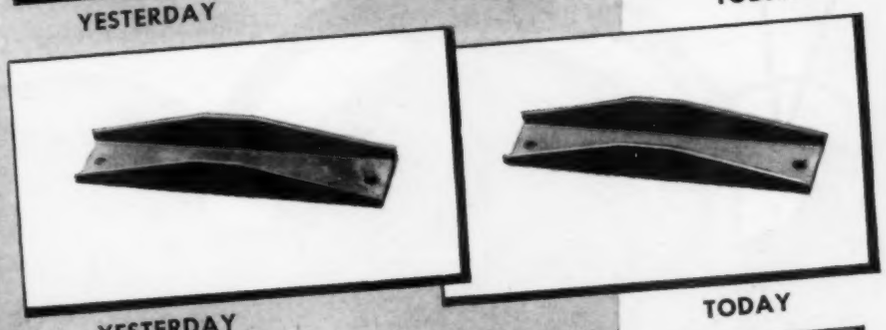


On highway and construction projects everywhere you'll see Ransome "Blue Brute" concrete equipment—dual and single drum pavers, "Hi-up" truck mixers and agitators, large stationary mixers and smaller portable mixers. Intent on continuously improving its equipment, and faced—like all manufacturers—with the necessity of reducing costs, Ransome, in 1947, attacked these twin problems by installing a Baldwin hydraulic press. The reduction in production operations, and the improvement in results, are indicated by the typical examples shown. Baldwin-Southwark Hydraulic Presses are helping manufacturers in many lines to make better products, at higher speed, and at lower cost. If you look, you can probably find places in your factory where a Baldwin press could serve you. If you would like to see a Baldwin representative, please get in touch with the nearest Baldwin office.



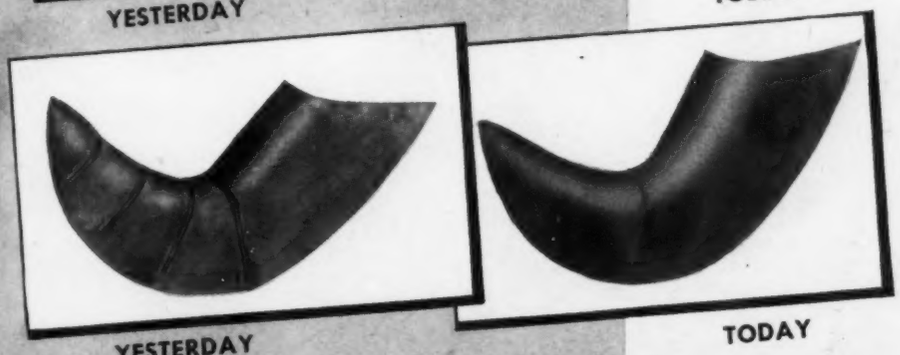
YESTERDAY—*Discharge chutes, of various types and sizes, were formed on a brake, by as many as 30 separate operations.*

TODAY—*The sheared blank is placed on a die, and formed to smooth, exact shape in a single operation.*



YESTERDAY—*Drum door holddown plates were formed on a brake, in two operations.*

TODAY—*The holddown plates are formed on the press with one stroke of the ram.*



YESTERDAY—*Individual sheared segments were bent, assembled in a jig, and welded. Each weld left a "dam" to obstruct the smooth flow of concrete.*

TODAY—*Long sections of the discharge blades are formed in one operation. In addition to cost reduction, the unobstructed floor means better product performance.*

BLW THE BALDWIN GROUP

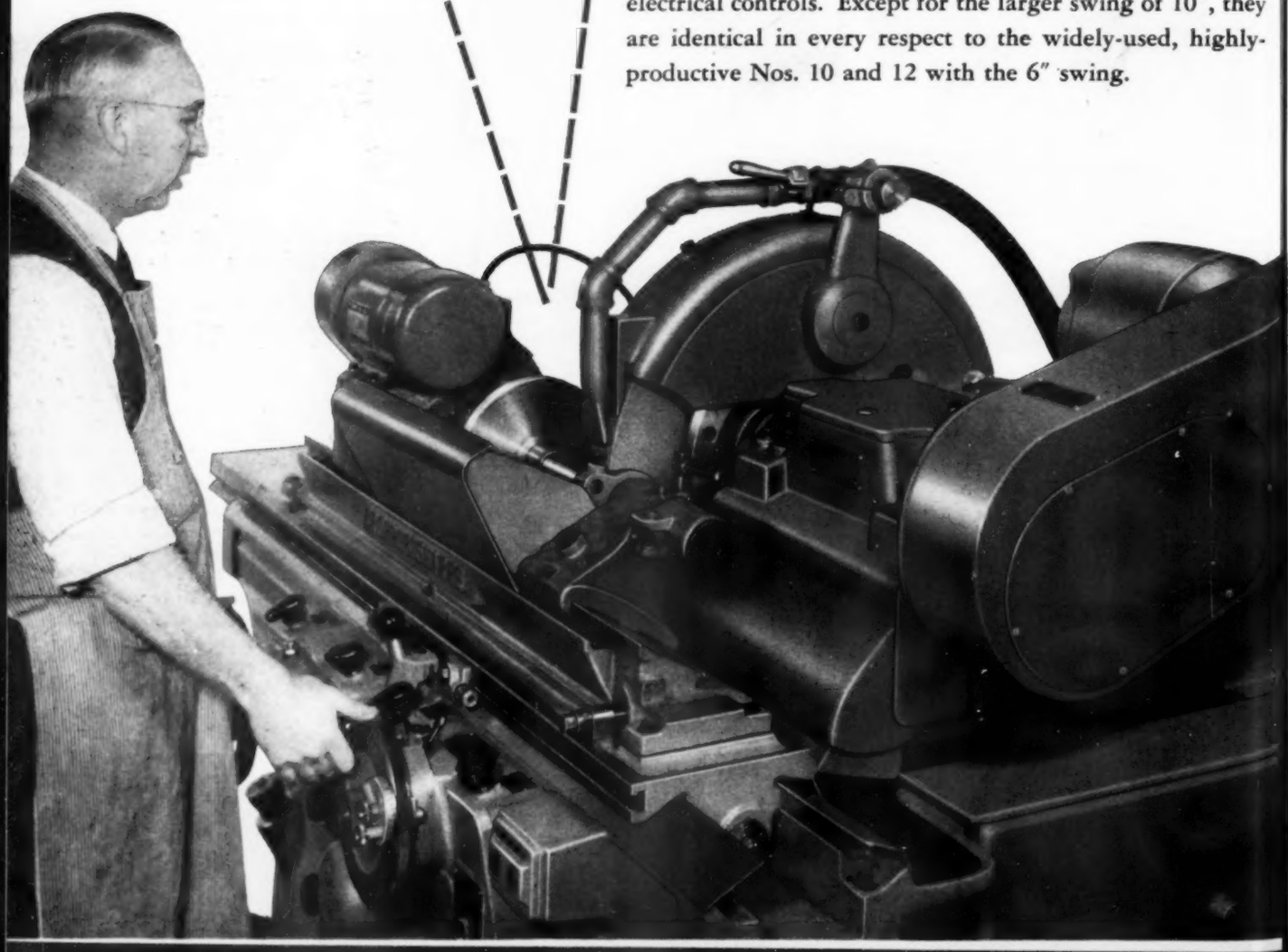
The Baldwin Locomotive Works, Philadelphia 42, Pa., U. S. A.

Offices: Boston, New York, Philadelphia, Birmingham, Houston, St. Louis, Chicago, Cleveland, Pittsburgh, San Francisco, Seattle, Washington.

NEW! a 10" swing for Nos. 10 and 12

PROVIDES AMPLE CLEARANCE FOR LARGER DIAMETERS AND PROJECTIONS

THE NEW, 10" swing machines, like those with the 6" swing, are designed particularly for the rapid cylindrical grinding of small and medium-sized parts to close limits on a production basis. They can grind many parts to limits of .0001" tolerance with consistent uniformity on ground diameters up to 3". These machines are compact and self-contained and are operated by very simple hydraulic and electrical controls. Except for the larger swing of 10", they are identical in every respect to the widely-used, highly-productive Nos. 10 and 12 with the 6" swing.



BROWN &

Plain Grinding Machines

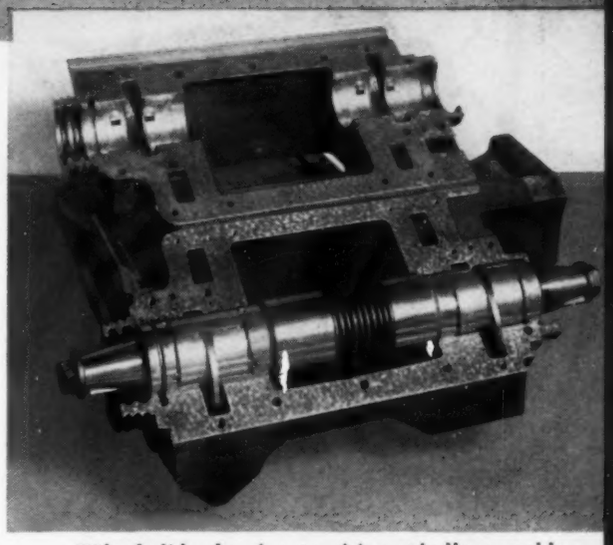
HIGHLY-PRODUCTIVE FEATURES OF TIME-TESTED NOS. 10 AND 12 MACHINES

ONCE THESE machines have been set for a given production job, they can be operated entirely by only two controls . . . the cross feed handwheel and the table start-stop knob.

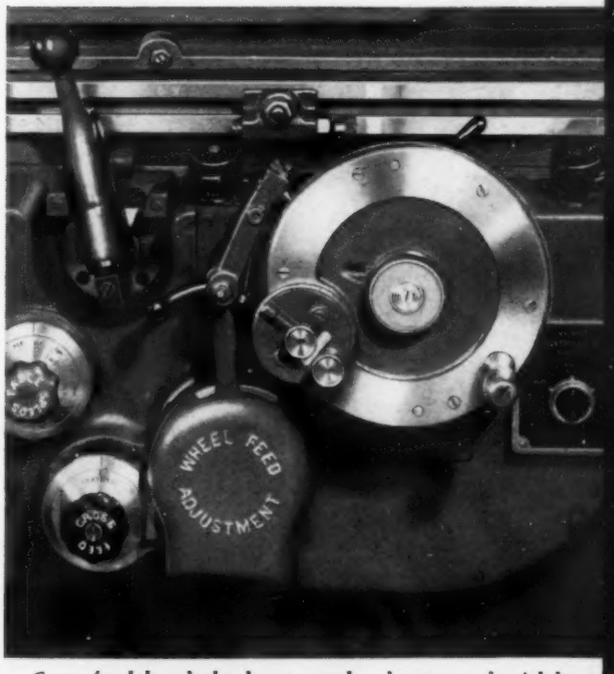
Their unique spindle design assures rapid, trouble-free precision grinding. Spark-out time is at a minimum due to unusually small clearance between spindle and its boxes—practically eliminating radial spindle play. The spindle is ground to extremely close limits of concentricity, straightness and finish and is lubricated with extra-light spindle oil.

Correct adjustment of spindle boxes is quickly and positively obtained with the spindle running . . . a very simple job.

Other up-to-the-minute advantages include time-saving knob controls, individual motor drives, cross feed mechanism with adjustment to .0001" on diameter and automatic oiling. They all add up to surer, easier operation that means faster, better production. Write for Bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



Wheel slide showing precision spindle assembly.



Cross feed handwheel—controls advance and withdraw of grinding wheel and start-stop of headstock and coolan

CAPACITIES

6" Machines, No. 10 (6" x 18"), No. 12 (6" x 30"). Centers swing 6 1/16" diameter over table. Distance center line of work to center of wheel spindle, greatest, 14 1/8", least 7 5/8".

10" Machines, No. 10 (10" x 18"), No. 12 (10" x 30"). Same grinding capacities as 6" except centers swing 10 7/8".

SHARPE

B·S

Shop Set MTT . . . 35 blocks giving 140,000 combinations in ten thousandths. Price in mahogany case, $100.00.

Economy Set MT . . . Over 5000 combinations in thousandths. Price in mahogany case, $40.00.

Micrometer Set M21 . . . Includes 1", 2", 3", 4", 5" and 6" Microgages. Price in mahogany case, $60.00.

Toolmakers Set M64 . . . Gives 121 combinations in 16ths, 32nds and 64ths. Price in mahogany case, $17.50.

The New Van Keuren

7/8" DIAMETER MICROGAGES *are the best buy . . . . . .*

60% More Wearing Surface . . . 25% Greater Accuracy . . . No increase in price.

A FOUNDATION FOR ACCURACY FOR 25 YEARS

Van Keuren Microgages have been popular for over 25 years, because they provide a low cost means of securing accuracy in the shop, to meet the demands of the inspection department. The original Microgages were made 11/16" in diameter. The 7/8" body diameter of the NEW Microgages are ground true cylinders, and the end surfaces are held square with the body within close limits. This enables them to be easily aligned on machine ways for measuring carriage travel. The new Microgages have 40% more wearing surface than rectangular gages and they wring together tenaciously. The 7/8" diameter body provides excellent rigidity for the 6" long blocks.

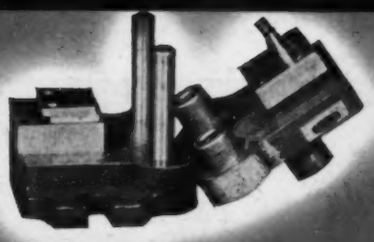
Microgages up to 1" length are held within a tolerance of plus 12 millionths minus 8 millionths. They have an average wear allowance of 4 millionths oversize. They are available as individual gages from .0625" to 6" length, or in sets especially designed for general shop use, for tool setting and for tool makers and machinists.

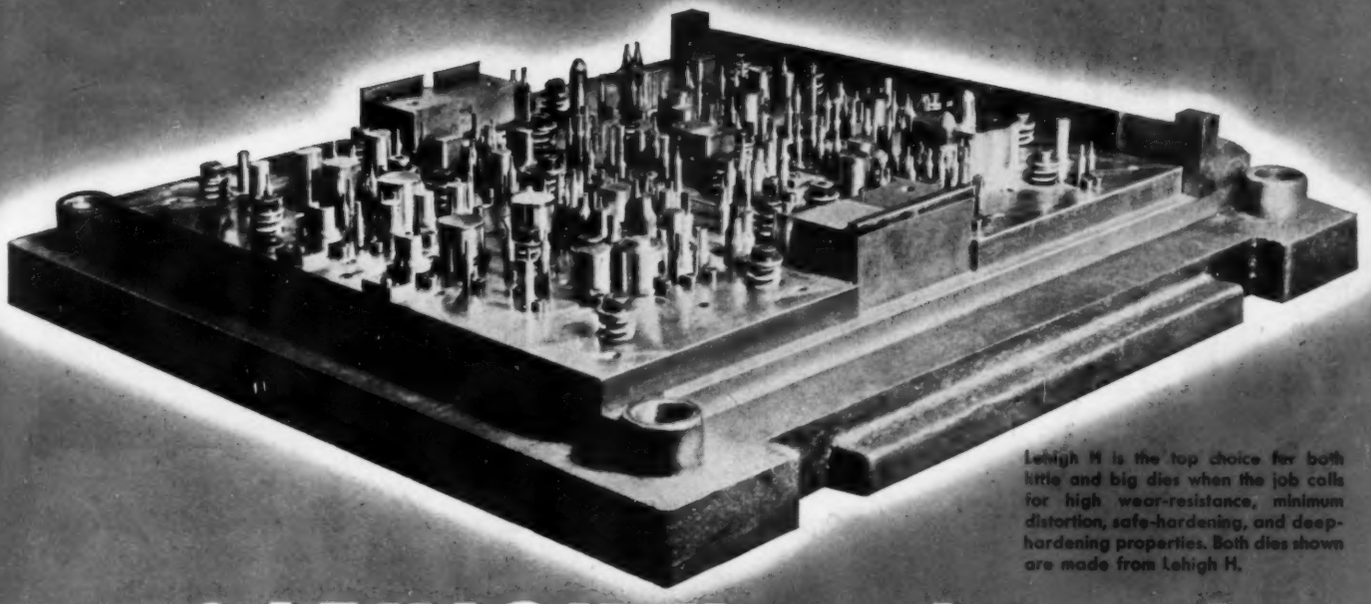
THE Van Keuren CO., 176 WALTHAM STREET, WATERTOWN, MASS.

29th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

Little dies and BIG dies





Lehigh H is the top choice for both little and big dies when the job calls for high wear-resistance, minimum distortion, safe-hardening, and deep-hardening properties. Both dies shown are made from Lehigh H.

# of LEHIGH H tool steel

for maximum production

Lehigh H has a high-carbon, high-chromium composition with characteristics that make it the aristocrat of tool and die steels. And here's how this fine steel is put to best use:

For maximum production. Lehigh H, due largely to its high-carbon content, is first choice wherever resistance to wear and abrasion is a big factor. Use it for long runs.

For close tolerances. Lehigh H is air-hardening, with the very minimum of change in size and shape during heat-treatment.

For safe hardening. Lehigh H is cooled in still air from a hardening temperature of 1850 F. It eliminates cracking hazards for intricate dies, thin sections, short radii.

For severe service. Lehigh H is extremely deep-hardening, even in large sections. It has high compressive strength for heavy-duty tools and dies.

Here's a grade of tool steel that's been proved by years of making good in toolrooms and production lines. It's most frequently used for tools and dies for blanking, punching, forming, shearing and bending. Use it also for lamination dies, shear blades, drawing dies, wearing plates, taps, gages, bending rolls . . . wherever you need great accuracy in size, long runs, and a steel that is bred for severe service.

	C	Cr	V	Mo
Typical Analysis:	1.55	11.50	0.40	0.80

Working Hardness: Rockwell C 58 to 62

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

LEHIGH H . . . one of Bethlehem's Fine Tool Steels

PUT IT ON THE BLANCHARD

The one best way of grinding three-way pieces

THE JOB

Produce a true flat surface on the central flange of the illustrated cast iron Three-Way Pieces—removing an average of 1/8" of stock from the rough casting.

THE METHOD

The parts are held in simple, inexpensive, mechanical, clamping fixture. 12 of these fixtures are held magnetically on a 36" chuck of a No. 18 Blanchard Surface Grinder.

BLANCHARD PRODUCTION

Actual grinding time for each load of 12 is 4 to 5 minutes. Floor-to-floor time is 60 pieces (60 surfaces) per hour.

This job illustrates the ease of adapting BLANCHARD GRINDING to the machining of flat surfaces of odd-shaped pieces. One operation quickly produces the required smooth, accurately sized, flat surface on the entire chuck load of parts. The grinding wheel of a Blanchard takes broad cuts over a large surface area continuously—removing metal at all times—*not* grinding air. This results in greater accuracy, finer finish, and better production. In short, BLANCHARD GRINDING is the one best way of producing flat surfaces on most of the products of modern industry.

Blanchard Engineers will be pleased to study the adaptability of Blanchard Grinding to your odd-shaped work. Just send us the data with, if possible, samples. Blanchard Consultation Service and Sample Grinding are free for the asking and involve no obligation.

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

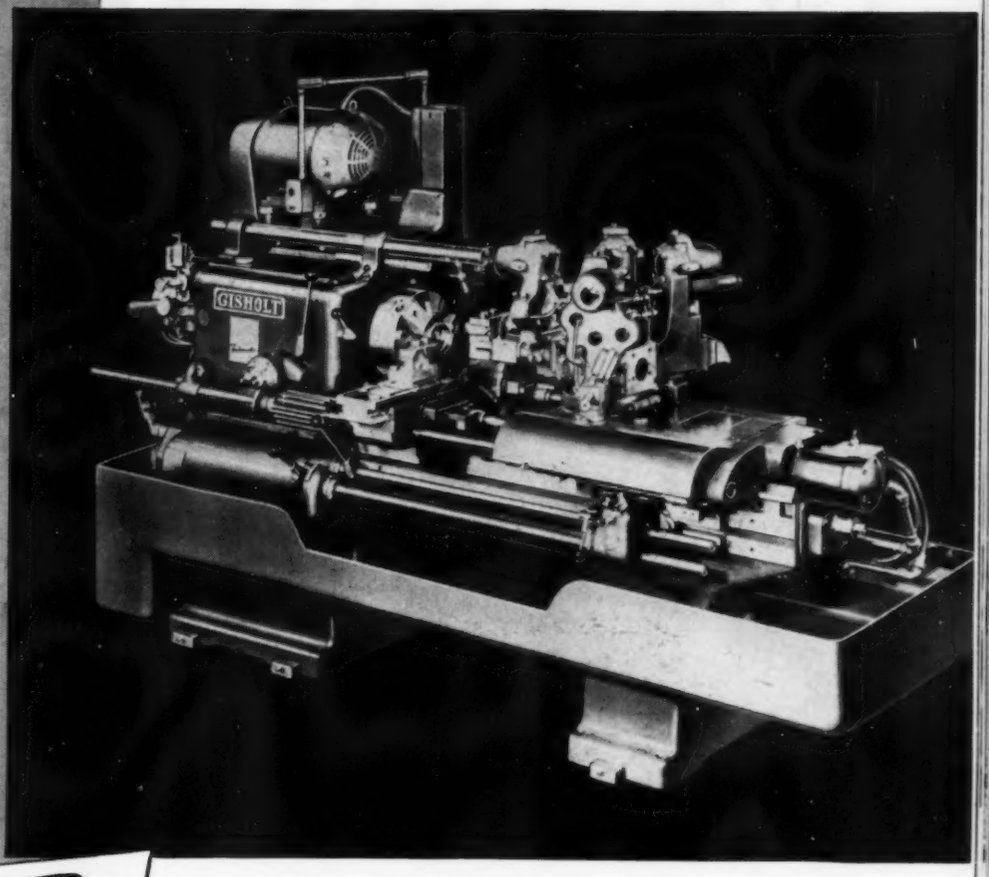
The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

GISHOLT

FASTERMATICS

AUTOMATIC TURRET LATHES



FASTER operating cycle

FASTER speed changes

FASTER feed changes

FASTER job set-ups

FASTER production

If you have work calling for a maximum number of surfaces to be machined in one chucking — investigate the Fastermatic. Six turret faces and two independent cross-slides provide a degree of flexibility not found in any other type of standard machine of comparable size. Completely automatic operation gives you the speed to cut costs on a wide range of jobs. Write for the Fastermatic catalog.

THE GISHOLT ROUND TABLE

represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Specify SIMONDS METAL-CUTTING BAND SAWS

for Smoothness . . . Strength . . . Service

These three types of Simonds Band Saws . . . made from special Simonds steel . . . with evenly set, milled teeth . . . will do any bandsawing job for you faster and better, at lower cost:

Regular Hard-Edge Band Saws: For speed-cutting alloy steels and other ferrous metals. 8 widths and tooth sizes, for general and contour cutting.

Skip-Tooth Band Saws: For speed-cutting plastics, aluminum, magnesium and other soft, non-ferrous materials which require extra gullet-capacity to clear large chips. 4 widths and tooth sizes.

Spring Temper Band Saws: For speed-cutting thin aluminum sheets, magnesium and steel . . . as well as light structural shapes, plastics, fibre, etc. 7 widths and 5 tooth sizes.

Extra Savings: Don't divert your millers, shapers, lathes and drills to work that Simonds Band Saws can do *better and faster!*

And don't overlook the opportunity to save by making your own gages, templates, etc., from Simonds Flat Ground Steel Stock cut by Simonds Metal Bands . . . a top money-saving combination. Ask your Distributor.

SIMONDS ALSO MAKES:

CIRCULAR METAL-CUTTING SAWS (Solid-Tooth, Inserted-Tooth, Segmental)

FLAT GROUND STEEL STOCK (Oil Hardening)

"RED TANG" FILES

"RED END" HACKSAWS

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.
Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS — Special Electric Furnace Steels
SIMONDS — Grinding Wheels and Grains
SIMONDS — Simonds Products for Canada

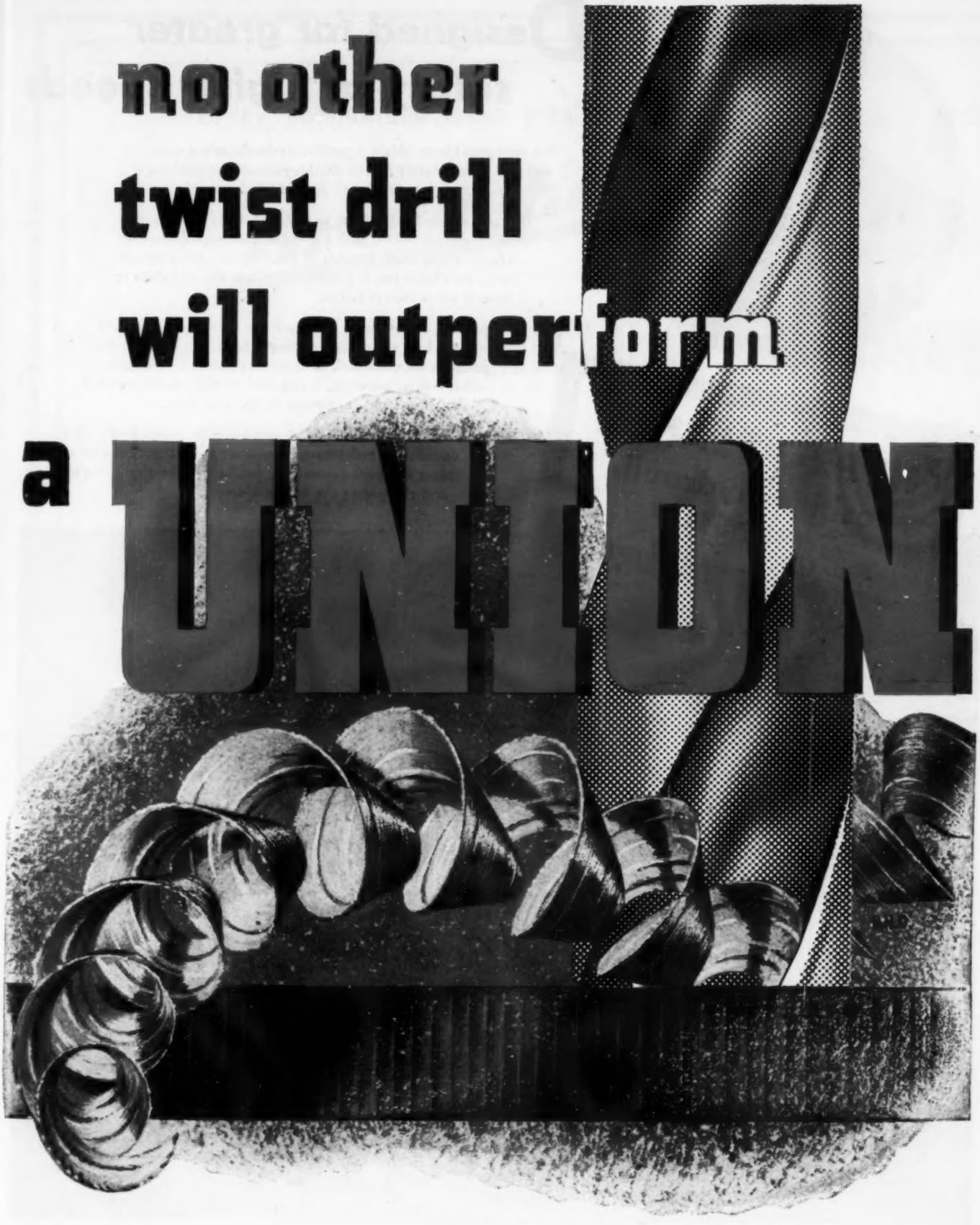
BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Avenue, Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Wash. *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

SIMONDS METAL-CUTTING BAND SAWS

REGULAR HARD EDGE . . . SKIP-TOOTH HARD EDGE . . . AND SPRING TENSION SAWS

WHEN YOU USE SIMONDS YOU STAY IN THE HIGHLANDS . . . OF CONSISTENT CUTTING EFFICIENCY

no other twist drill will outperform a UNION



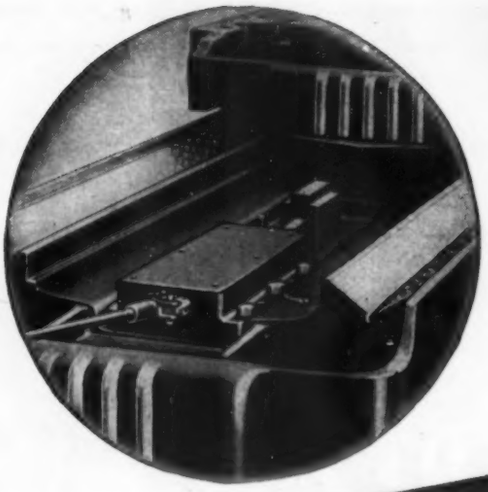
contact your local distributor

UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS

MILLING CUTTERS • GEAR CUTTERS • TWIST DRILLS • HOBS • REAMERS • CARBIDE TOOLS

We own and operate S. W. CARD MANUFACTURING CO., Division, Mansfield, Mass.

BUTTERFIELD DIVISIONS, Derby Line, Vt., Rock Island, Quebec. Manufacturers of Taps, Dies, Screw Plates, Reamers



Designed for greater safety at higher speeds

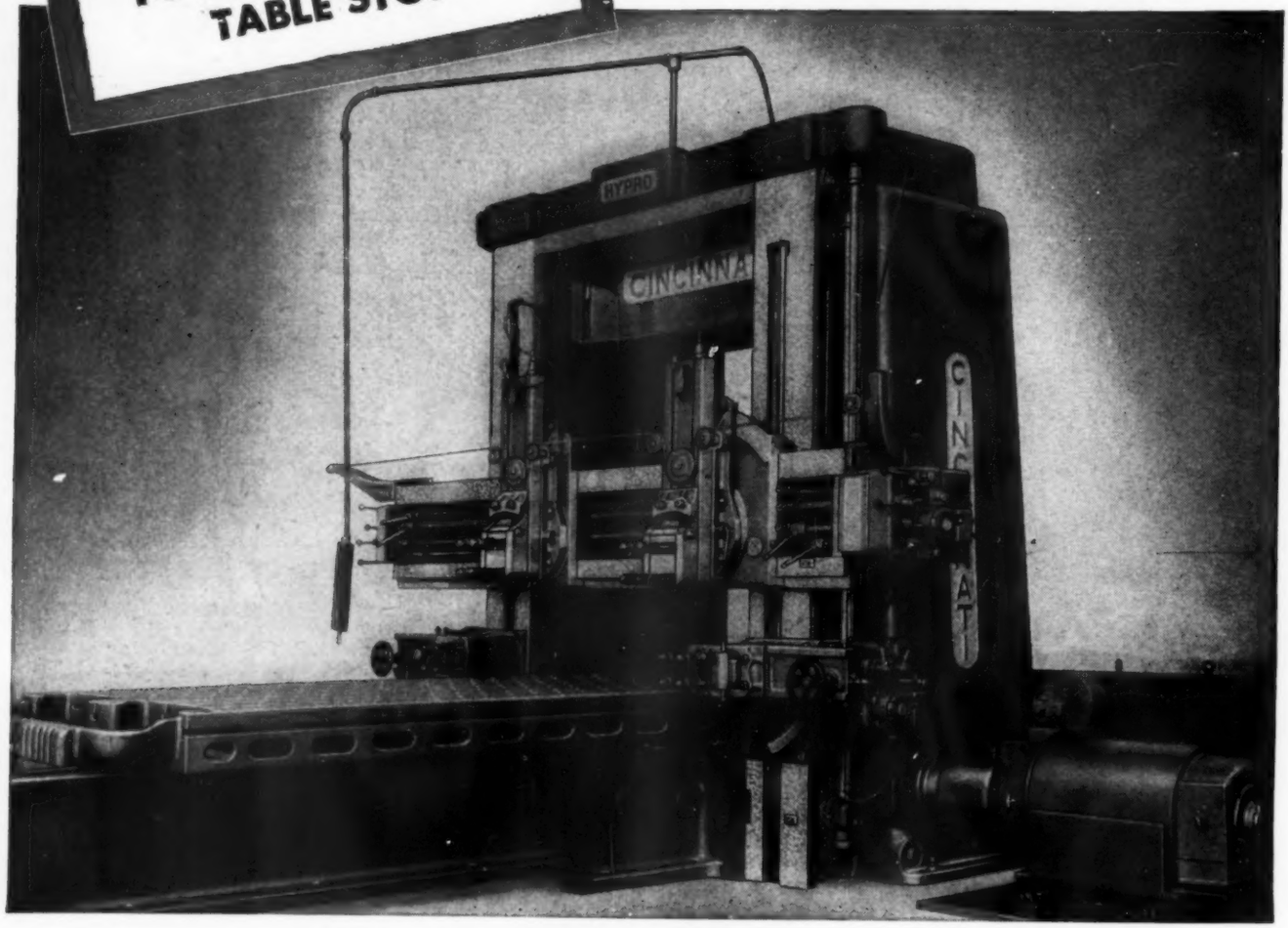
It is now possible to obtain a positive hydraulic safety stop and jack to completely protect anything around the machine in case of complete failure of the electrical control.

This safety stop is designed to stop the table quickly in case of control failure with a uniform decelerated motion without severe shock to parts of the Planer. All parts are completely enclosed to protect them from dirt and chips so there is no chance of failure.

This stop also is used as a jack for relocating the table over the bull wheel by inserting a handle in the stop and pumping the table back to its running position. No crane or other means, therefore, is required for this operation which invariably results in damage to the gear teeth.

After the stop is used it automatically resets itself. The operator or maintenance department does not have to replace any parts or reset any mechanism, thereby saving time and eliminating the human element.

HYPRO PLANER
Positive Hydraulic TABLE STOP



THE CINCINNATI HYPRO PLANER COMPANY

PLANERS · BORING MILLS · PLANER TYPE MILLERS

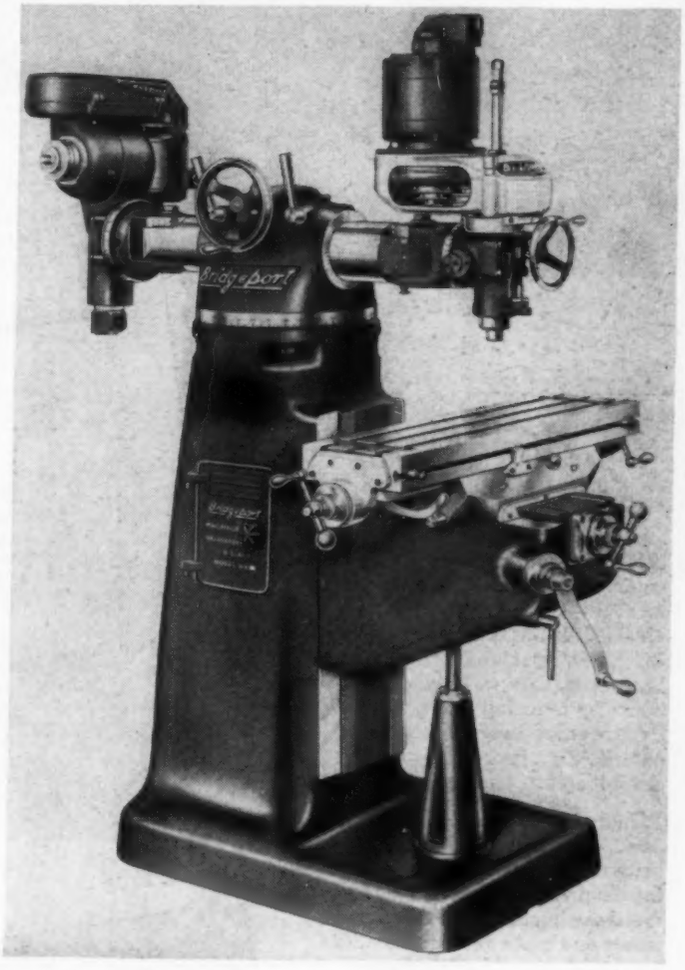
CINCINNATI, OHIO

Tooling possibilities mean greater productivity and lower costs with

Bridgeport TURRET MILLING MACHINES

NEARLY 10,000 'Bridgeports' are in everyday service at this moment simply because their owners found that they couldn't handle their work under today's competitive price structure on yesterday's machines. When costs were scrutinized in these shops, it was obvious that old equipment was *costing* money instead of *making* it. Bridgeport Turret Milling Machines have helped solve the problem of high production costs.

The experience of shops which have put 'Bridgeports' to work is such as to suggest your exploring the possibilities of these modern machines which mill, drill, bore, and shape at all angles without changing set up. It s easy to make a conclusive comparison of 'Bridgeport' cost-cutting performance with your present method of handling the same work. Ask for our assistance in making such a check-up.



• SPECIFICATIONS

Longitudinal Feed . . . 20" with standard 32" table

Cross Feed . . . 9"

Vertical Feed of Knee . . . 16"

Tables 36", 42" and 48" are available; also longitudinal power feed.

Weight with Shaping Unit . . . 2,000#

Bridgeport MACHINES, INC.
Bridgeport, Connecticut

MARVEL Saws Speed-Up Deliveries

TUBE DISTRIBUTORS CO., IN

Warehouse Mill Distributors:
Globe Steel
Bethlehem Steel
Jones and Laughlin
Jackson Tube
Michigan Seamless

Offices and Warehouse: 150 Green Street, Brooklyn 22, N.Y. - Phone EVergreen 9-600

Armstrong-Blum Mfg. Co.
5700 West Bloomingdale Avenue
Chicago 39, Illinois

May 6, 1947

Gentlemen:

In a short time we expect to place an order with you for another No. 9A Marvel Automatic Hack Saw. This is in addition to the two machines we now have.

Our present Marvel Automatic Hack Saws are giving us very satisfactory service, enabling us to speed cutting of mechanical and boiler tubes to our customers' required lengths at a minimum of cost, both for labor and blades.

Your service and attention to our requirements have been very satisfactory.

Sincerely,

TUBE DISTRIBUTORS CO., INC.

A F Lewis

Superintendent

AFL:CB

Steel warehouses and stockrooms deliver cut-off lengths in any quantity FASTER—BETTER—CHEAPER when equipped with MARVEL 6A and 9A Automatic Hack Saws. Far faster, floor to floor, than any other hack saws, they save valuable machine hours by reducing cutting-off time to a fraction—save other machining hours by producing accurately cut pieces of exact length.

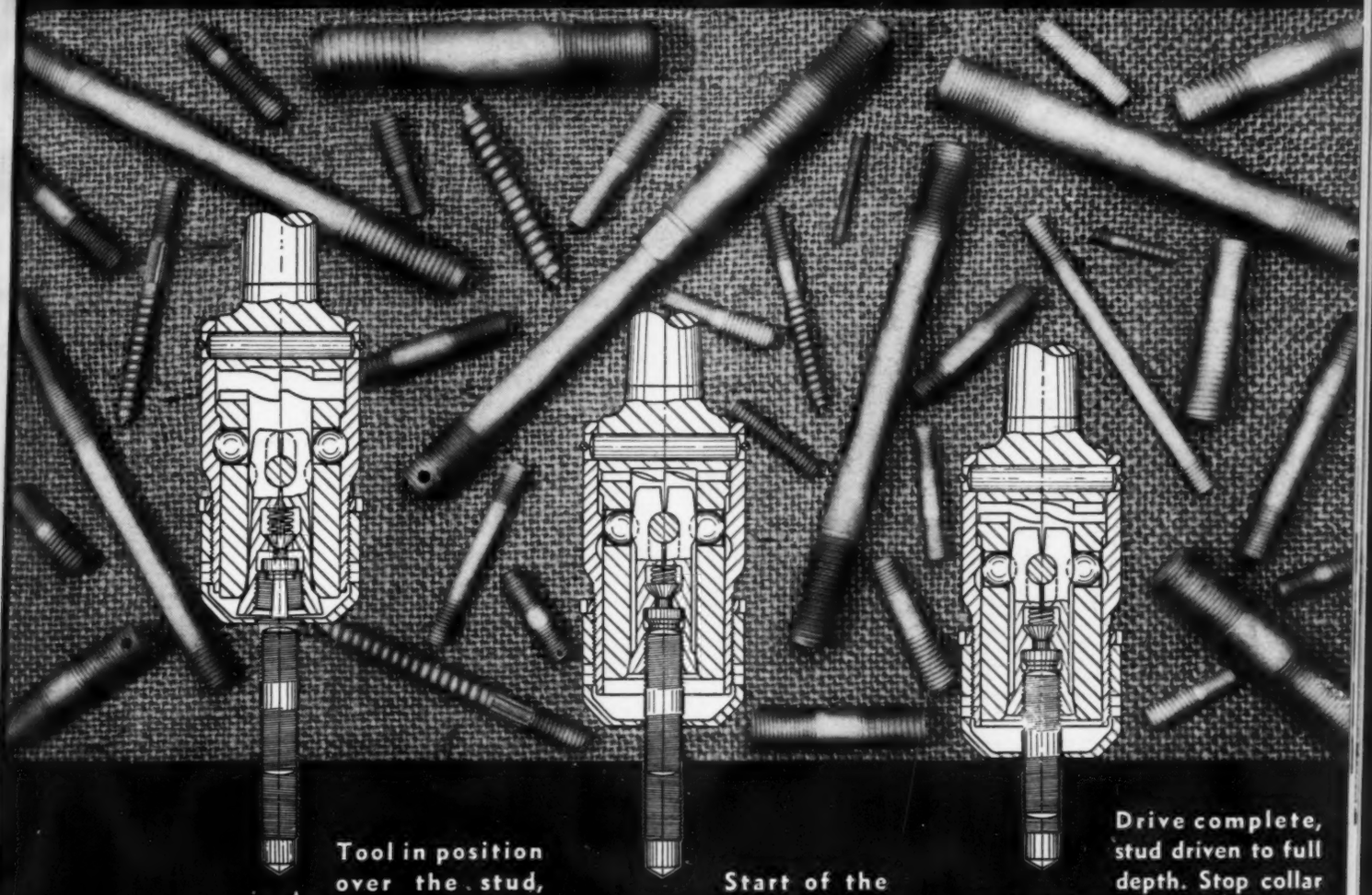
There is a MARVEL Saw for every need—in every capacity range and price class. Your local MARVEL Sawing Engineer will gladly study your metal sawing problems and requirements and make recommendations as to methods and equipment.

Metal Cutting
MARVEL SAWS
Better Machines-Better Blades

ARMSTRONG-BLUM MFG. COMPANY
"The Hack Saw People"
5700 BLOOMINGDALE AVENUE CHICAGO 39, U. S. A.

STUDS . . . .

and the tool to set them



Tool in position over the stud, ready to start the drive. Jaws are open to take the stud.

Start of the drive with tool engaged on the stud. With jaws locked.

Drive complete, stud driven to full depth. Stop collar contacts the work, releasing the clutch. Lifting the tool opens the jaws.

MODERN SELF-OPENING STUD SETTER

As the action of this tool is positive and automatic, it is conveniently operated in any position with either air or electrically operated portable tools. It is also adapted to use in a drill press where it is possible to drill and tap the holes and set studs in successive operations.

Let Modern Engineers help with your stud setting problems—send for Bulletin M-186

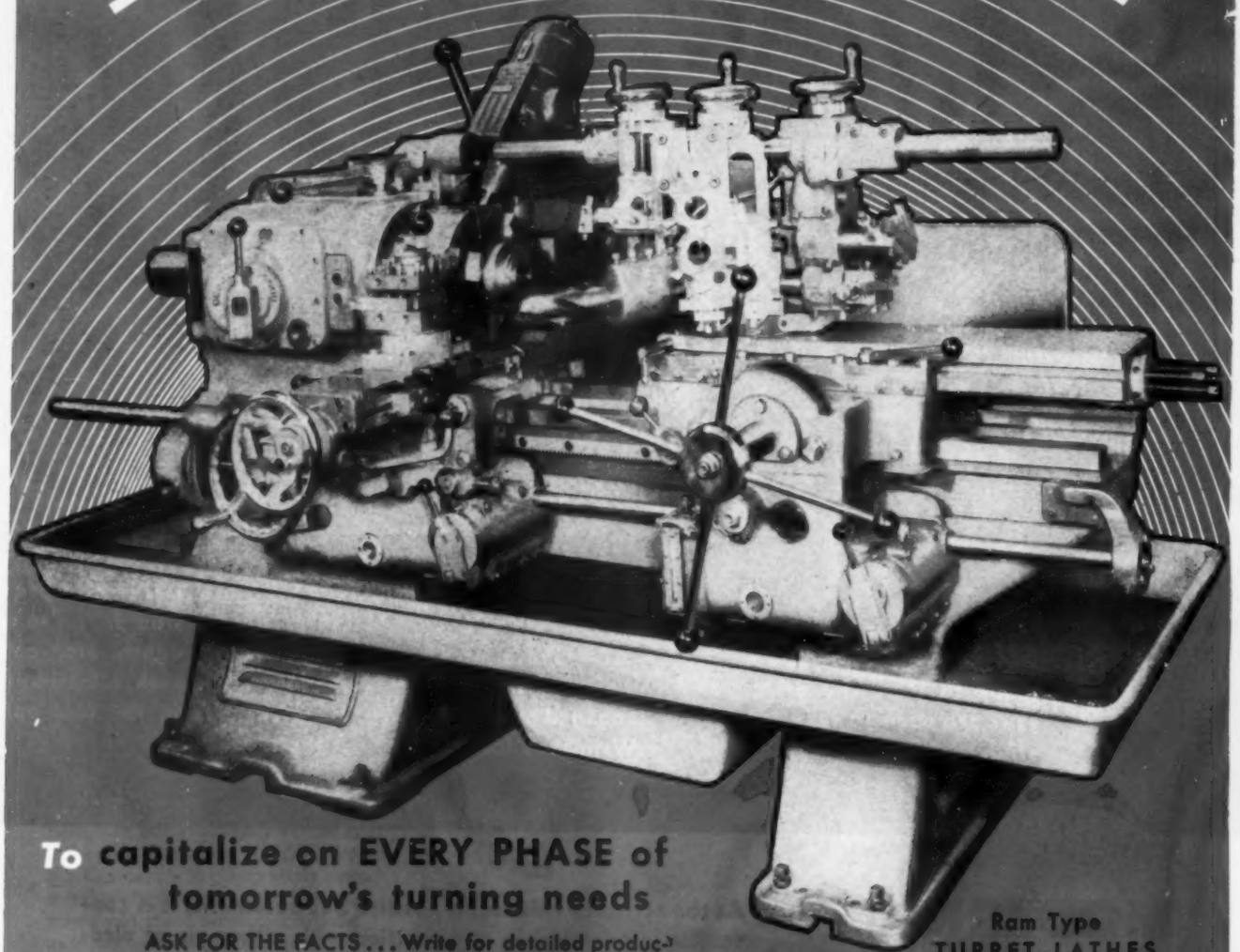
MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

POWERED for CARBIDE



To capitalize on EVERY PHASE of tomorrow's turning needs

ASK FOR THE FACTS . . . Write for detailed production reports (Literature Series 483), or better yet, ask for one of our engineers to study your lathe operations. His recommendations will reduce your costs.

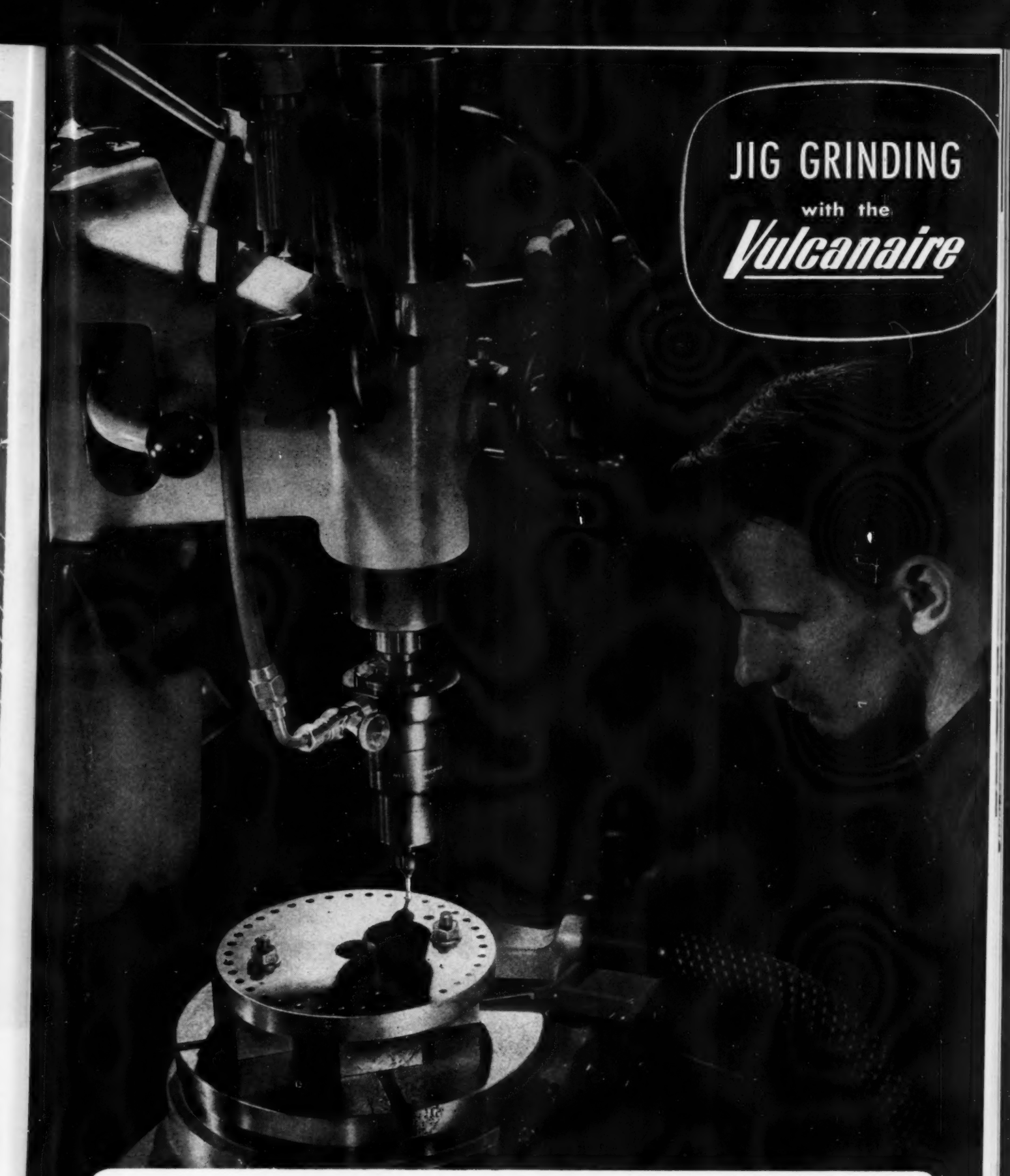
Ram Type
TURRET LATHES

- **FAST**
- **RUGGED**
- **VERSATILE**

Turret Lathe Division

J&L **JONES & LAMSON MACHINE COMPANY**
Springfield, Vermont, U.S.A.

MACHINE TOOL CRAFTSMEN SINCE 1835



WHEN jig grinding is needed you can have it quickly and economically with the VULCANAIRE. This precision attachment can be placed in the spindle of your jig borer (or other machine tools) and you can accurately locate and finish grind holes in hardened steel to "tenths" at controlled speeds ranging up to 65,000 RPM. The VULCANAIRE is a precision instrument that takes the high cost out of jig grinding.

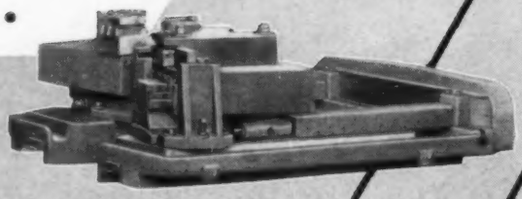
* * *

Write for detailed literature—or for a quotation, please advise the name and type of machine on which you would like to use the VULCANAIRE.

VULCAN TOOL COMPANY • DAYTON 10 • OHIO

THE GISHOLT SIMPLIMATIC AUTOMATIC LATHE

THIS PLATEN TABLE...



...OR THIS PLUNGE AND RADIAL HEAD

May save you the cost of a special machine... *Investigate it!*

THE SIMPLIMATIC—An automatic, single spindle, chucking lathe—adaptable to a wide variety of work that is produced in quantity.

—*with* **PLATEN TABLE** it provides a horizontal mounting using various tool slide arrangements for straight and angular turning, boring and facing cuts.

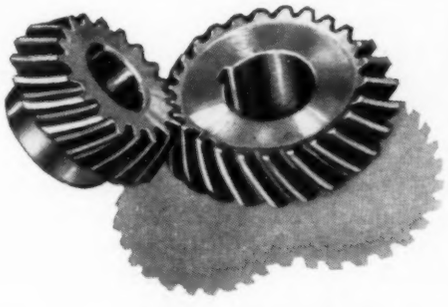
—*with* **PLUNGE AND RADIAL HEAD** it provides vertical tool mounting in front of the work with a minimum tool overhang; for combined operations on parts of large diameter with wide faces.

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY
MADISON 10, WISCONSIN

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

NEED A LOT OF *Better* SMALL GEARS?



SEND TODAY FOR FREE G.S. CATALOG-BULLETIN DESCRIBING MANY DIFFERENT TYPES AND APPLICATIONS OF OUR FRACTIONAL HORSEPOWER GEARS.

THE *mass production* of Fractional Horsepower Gears has been a highly developed specialty of ours for more than 30 years! Small Gears of every conceivable type . . made from many different materials for practically all known purposes . . flow from our modern machines by the thousands. *Each one* measures up to rigid high standards of uniform accuracy. *Each one* undergoes a series of tests that insure smooth, satisfactory performance and long life. *Each one* is handled with extreme care from one operation to another to safeguard its fine quality. If Small Gears form a component in the product you make, by all means entrust the job to our competent staff. Decide to test the speed and efficiency of economical G.S. service.

FRACTIONAL HORSEPOWER GEARS

GS

GEAR Specialties

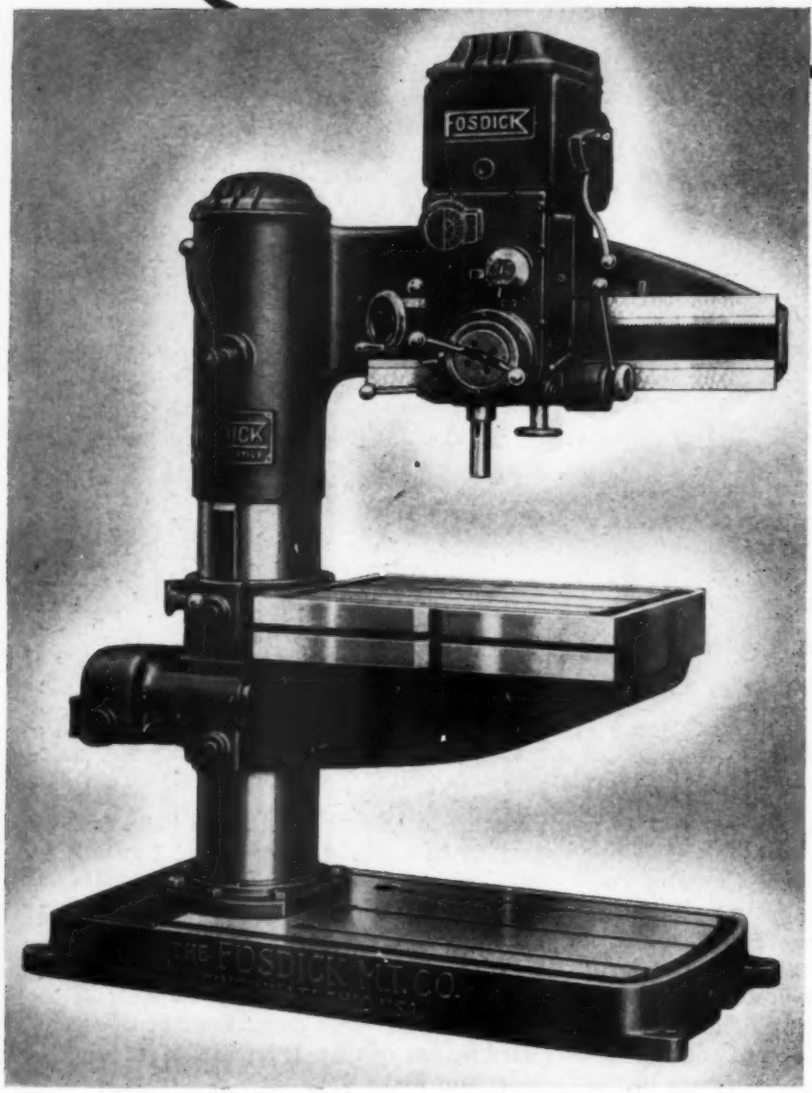
Spurs • Spirals • Helicals • Bevels • Internals • Worm Gearing • Racks • Thread Grinding

2635 WEST MEDILL AVENUE • CHICAGO 47, ILLINOIS

MEMBER OF AGMA

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS

Excites the imagination of all production minded men . . .



FOSDICK *Sensitive* RADIAL

● You just can't help being impressed by the sturdy simplicity of this distinctly new and different Fosdick Sensitive Radial.

For example, here are a few of its entirely new and different points of design—

Arm at fixed height.

Adjustable table.

Both table and arm swing in an arc of 360°.

One piece column.

One of the main advantages of this new table construction is that table is always in proper position for the job at hand. The standard base is always available for taller work with table swung around behind column.

The Head is of simple design and provides nine speeds and four feeds. Spindle speeds as low as 60 RPM and up to 3500 RPM are available. These speeds are controlled by a direct reading lever located at the bottom left hand side of the head. The feeds are controlled by a single direct reading lever at the right hand side of the head.

Not only does this new Sensitive Radial offer an improved design but inherent advantages in simplicity of control for the operator. All of which adds up to more work in less time and a lower cost per job.

Get the new Fosdick Sensitive Radial Bulletin SRA for complete details of construction and specifications.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

deep slotting in magnesium

with
BARBER
COLMAN
Job-Engineered
CUTTERS

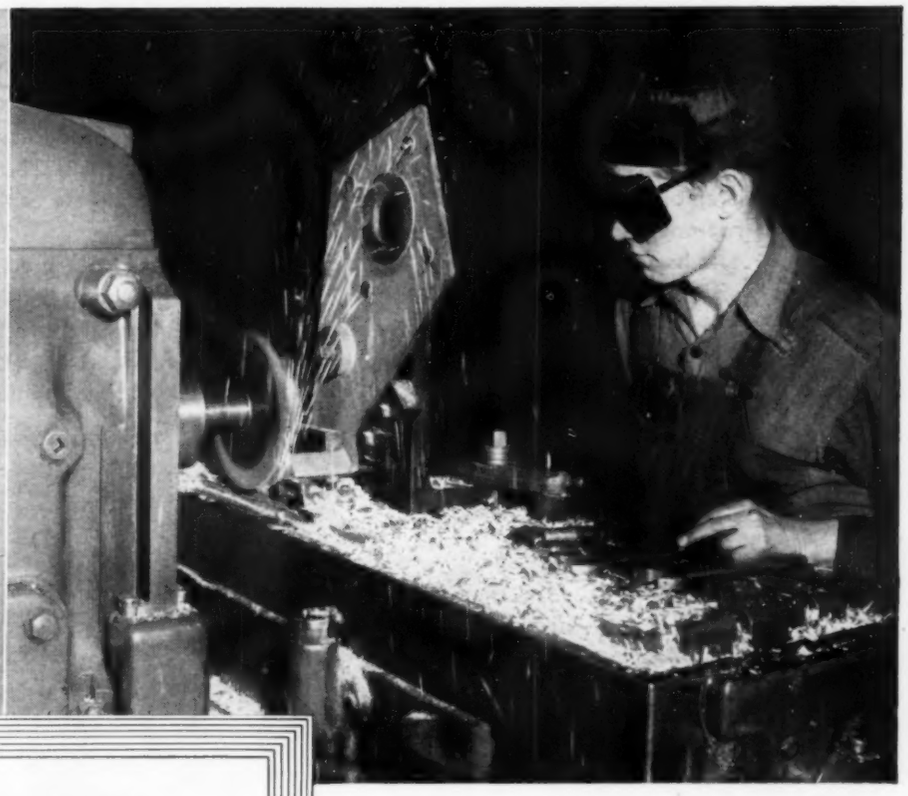
Deep slotting cuts in soft materials, when using conventional cutters, often result in chip congestion in the cutter, causing poor finish, and possible cutter breakage. Barber-Colman cutter engineers have designed a new style slotting cutter to take care of just such conditions.

On the job illustrated here . . . a typical example of this kind of milling . . . slots, 1.138″ wide x 1″ deep x 2″ long, are rapidly milled from solid metal in magnesium brackets. Cutting time averages two pieces per minute. A patented Barber-Colman improved design interlocking side milling cutter which has coarse staggered teeth arranged with continuous cutting edges, is used to provide a free flow of chips.

When production calls for high speed milling of light metals, call on Barber-Colman Engineers for long-lived, efficient cutters, specially engineered for the job.

Barber-Colman Company

GENERAL OFFICES AND PLANT 116 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.



JOB FACTS

Material — Cast Magnesium, Soft
Operation — Mill slot, 1.138″ wide x 1″ deep x 2″ long
Cutter — Patented B-C Interlocking Staggered Tooth Side Mill, 6″ x 1-3/16″ x 1-1/4″
Feed — 24″ per minute
Cutter Speed — 750 S.F.M., 480 R.P.M.
Floor-to-Floor Time — 1/2 minute
Tool Life — 300 pieces per sharpening

BARBER COLMAN
MODERN MACHINES DEMAND *Modern* CUTTING TOOLS

SPRINGFIELD

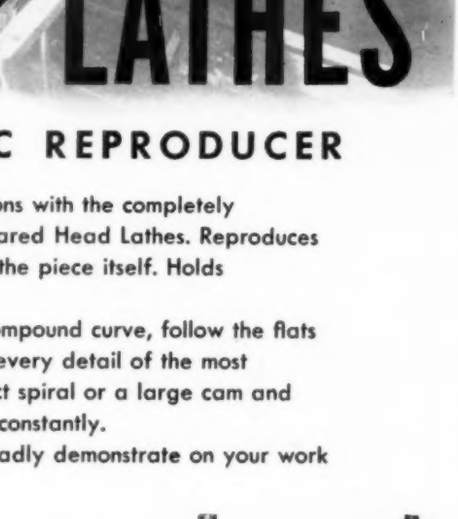
Geared Head LATHES

WITH SPRINGFIELD HYDRAULIC REPRODUCER

Now you can secure ***accurate*** three dimensional contour reproductions with the completely hydraulic, super-sensitive Springfield Reproducer on Springfield Geared Head Lathes. Reproduces internal, external, and face contours using a master, a template or the piece itself. Holds reproduction to extreme limits of accuracy.

Its usefulness and versatility are remarkable—it will trace a compound curve, follow the flats of a square milk bottle, profile and write simultaneously, bring out every detail of the most intricate design, turn a straight, smooth taper on a bar, cut a perfect spiral or a large cam and perform many similar money-saving, time-saving jobs that come up constantly.

Write today for catalog and complete information. We will gladly demonstrate on your work to show what the Springfield Reproducer will do.



Just two examples from many of the accurate reproductions from Springfield Reproducers. Letters and figures reproduced from the master; intricate designs reproduced on flat surfaces.

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

WORK *not* WEIGHT

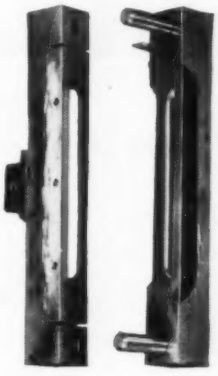
Proves KRW *Value*

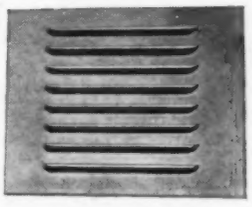
● KRW Hydraulic Presses — either Hand operated, Air operated or Motor driven — are so flexible in design and operation, that a little ingenuity plus a few simple and inexpensive dies often result in tremendous time and cost savings.

Gone is the old fashioned theory that most forming, blanking and stamping operations must be done on large, cumbersome presses. On the small run production job illustrated here, a farm machinery manufacturer was able to save considerably in both die and production costs by utilizing a standard KRW 75-ton press and low-cost dies as shown at the right.

Today, the term "arbor press" is a misnomer. In countless plants KRW Presses are doing thousands of jobs that, a few years ago, would have been done on larger equipment. KRW Hydraulic Presses are built in sizes varying from 25 to 100-ton capacities. All but the 100-ton press can be furnished as either hand operated, air operated or motor driven. Openings, bed widths, heights, etc. can be varied at very little extra cost to meet particular needs.

Before you buy a press, remember this truth — more often than not, "you don't need a sledgehammer to drive a tack." You can save plenty by bringing your production problem to KRW first. We're equipped engineeringwise to offer real help, no obligation of course.





INEXPENSIVE DIES AND A KRW PRESS

Illustrated at the left are the low-cost dies used by John L. Bubb Farm Machinery Co. of Baldwinsville, N. Y. on their KRW Press to form louvres in 16 ga. sheet steel as shown at the right. 3 tons pressure is required to shear and 10 tons to form the louvre. This is a highly economical set-up for the limited production necessary.

NAME YOUR NEEDS! MAIL COUPON!

K·R·WILSON

215 MAIN ST. · BUFFALO 3, N. Y.

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please send me complete information on KRW Arbor Presses ☐
100-ton Hydraulic Presses ☐

Name .....

Address .....

City and Zone ..... State..

PRODUCTION *demands* POWER *and* SPEED

This new GRAY Planer is a real cost cutter. No wonder the chips pile up as the costs go down—

300 ft. per minute cut and return speed—

2 heads cutting with modern carbide tools—

¾" depth of cut with .110" feed—

120 HP required to remove metal at the rate of 594 cubic inches per minute.

Result—4 Kirksite special auto dies in record time at low cost—

Can you compete? Better investigate the new GRAY PLANER

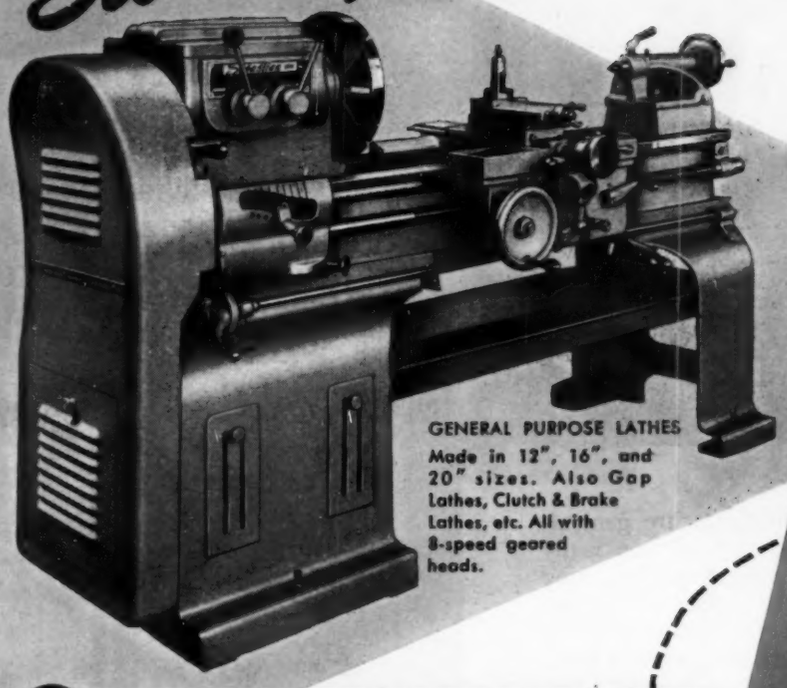
The G.A. **GRAY** *Company*

planers • milling planers
planer type milling machines
horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.
SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

Before You Buy Any Other Medium-Priced Lathe...

See what you get with a Sebastian TYPE "R" GEARED HEAD LATHE



GENERAL PURPOSE LATHES
Made in 12", 16", and 20" sizes. Also Gap Lathes, Clutch & Brake Lathes, etc. All with 8-speed geared heads.

1 ALL OF THESE ITEMS ARE SUPPLIED AS STANDARD EQUIPMENT, INCLUDED IN BASIC LATHE PRICE:

MOTOR & WIRING
REVERSING SWITCH
COOLANT PANS
SPINDLE SLEEVE
THREADING DEPTH STOP
LEVELING SCREWS & PLATES
CABINET LEG • TOOL POST
FACE PLATE • DOG PLATE
CENTERS • WRENCHES

In addition to above items, Apron Control and Center Leg are also included as standard equipment on lathes with 10', 12' and 14' beds.

2 OUTSTANDING FEATURES

TIMKEN TAPERED ROLLER BEARINGS (pre-loaded) on all shafts in headstock, including spindle, assuring extra-high accuracy and 20% more power.

OVERSIZED, HEAT-TREATED STEEL GEARS in headstock, assuring longer life and a powerful head.

AUTOMATIC SPLASH LUBRICATION for all gears in headstock.

NEUTRAL POINT IN HEAD permits revolving spindle freely by hand for chucking work.

LARGE HOLE through spindle.

APRON CONTROL for start, stop, and reverse of lathe spindle. (Standard on lathes with 10', 12', and 14' beds.)

REVERSE IN APRON for feeds.

TAPER GIBS throughout.

CROSS-FEED AND COMPOUND-REST DIALS are friction type and graduated. No set screws to tighten.

57 FEED AND THREAD CHANGES.

3

Manufactured By KING

BUILDERS OF WORLD-RENOWNED "KING" BORING & TURNING MACHINES

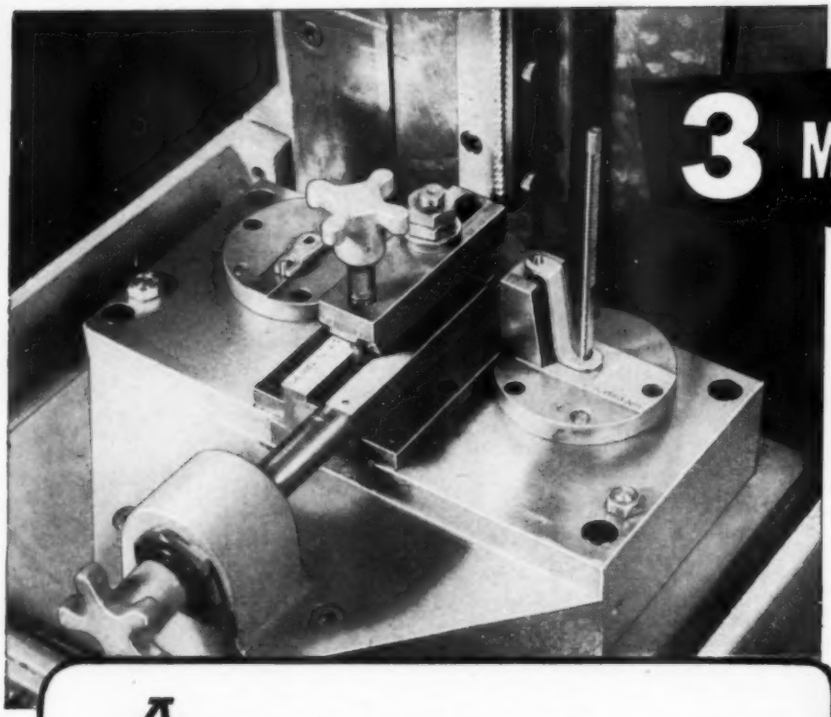
Built in the ultra-modern King plant, made to traditional King precision standards, the new medium-priced Sebastian Lathe incorporates every big lathe feature contributing to higher accuracy, ease of operation, longer service life. See your Sebastian Dealer... and write today for "just off the press" Catalog S-1 (Standard Type "R" Lathes) and Catalog S-101 (Special Type "R" Lathes—Gap, Clutch & Brake, etc.)

American Steel Foundries

KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of King Vertical Boring & Turning Machines and Sebastian Lathes



3 MACHINES IN 1

You Can Do
PULL DOWN INTERNAL BROACHING
PUSH DOWN INTERNAL BROACHING
and SURFACE BROACHING
on the *American* 3-way

American 3-Way Broaching Machines are general-purpose machines that can be used efficiently on many classes of work. They are adaptable to internal broaching (both push down and pull down) and surface broaching; and are easily changed over from one operation to another.

American 3-Way Broaching Machines are easily operated, highly productive, and flexible in their applications. Their quick change-over makes them especially suitable for broaching in limited quantities. Six standard models are available—4, 6, or 8-ton sizes with 24" stroke, and 8, 10, or 15-ton sizes with 36" stroke.

Photo at top of page illustrates one of many multiple tooling arrangements possible on the *American* 3-Way. Permanent tooling set up is adapted to either surface broach a slot at the center station, or internal broach flatted holes at left and right hand stations. *Left:* Parts for automatic transmissions before and after broaching. Small part at top is shown before broaching to form slot and finish flatted hole. Flatted hole has also been finished in lower section of center part. *Right:* A sliding fixture locator is used at the center station of this *American* 3-Way Broaching Machine to allow loading and unloading clear of broach assembly. At other stations parts are located by pins.

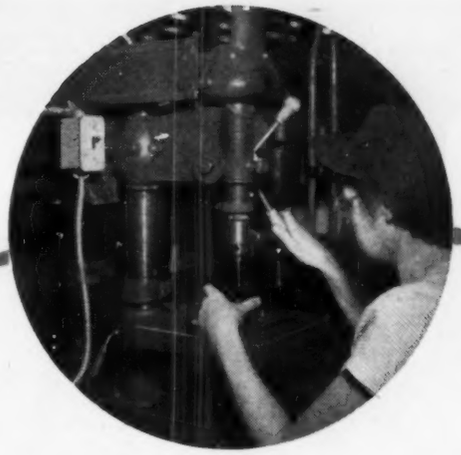
Full details and specifications on *American* 3-Way Vertical Hydraulic Broaching Machines are given in this new illustrated bulletin. Write for your free copy. Just say "Send me Circular 100 S."

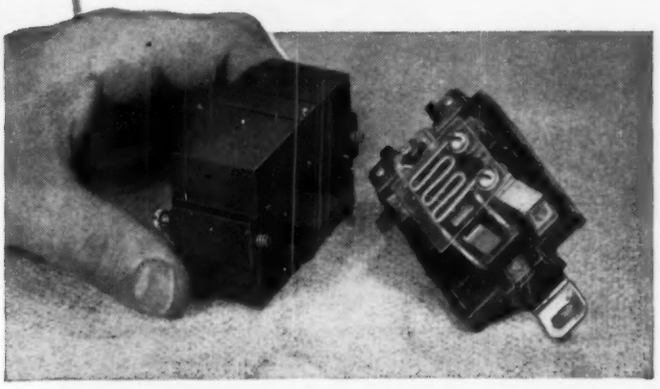
AMERICAN *American* BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

See *American* First—for the Best in Broaching Tools, Broaching Machines, Special Machinery





F-HP* MOTOR-STARTING SWITCH . . .

New Design for improved performance

Entire new line of CR1061 manually operated switches—general purpose, water-tight, explosion-proof types—now available. New from cover to heater. Check these features for:

EASIER INSTALLATION

- All wiring terminals easily accessible on top of switch unit
- Heaters have one mounting screw fastened in position to prevent incorrect mounting—stamped with current rating

POSITIVE OVERLOAD PROTECTION

- Employs sturdy bi-metallic protective device
- Positive indication power is off as switch handle moves to OFF position on overload

LONGER LIFE

- Self servicing—wheel-type movable contact cleans as it rolls against stationary contacts
- High interrupting capacity—arc snuffed quickly as silver contact recedes into recess in base

*Fractional Horsepower

USE . . .

On a-c up to 1 hp at 110 to 220 volts
On d-c—¾ hp 115 volt, ⅓ hp, 230 volt
double-pole forms for 1 hp, 115 to 230 volts d-c
Fill in the coupon and send it in for more information. *Control Division, Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

Apparatus Dept., Sec. D676-276
General Electric Company
Schenectady 5, N. Y.

Gentlemen:

I want to know more about your new CR1061 switches. Please send me Bulletin GEA-2234E.

NAME.....

COMPANY.....

ADDRESS.....

.....

GENERAL ELECTRIC

Now THAT HANDY *All Purpose* WORK CLAMP IN 2 SIZES

LOCK JAW

Stops

SHIMMYING
BUCKLING
HEAVING
SLIDING
YAWING
CHATTERING

Applied as a three jaw chuck on face plate.

Model A on small toolroom horizontal miller.

Eliminates expensive and cumbersome clamping and bolting operations.

Now the heavier Model B Lock Jaw for large table operations and a brand new Model A for positive clamping on smaller machines with limited table space. The new and lighter clamp has interchangeable jaw faces formed to fit contour of work.

The same positive, powerful two-way locking, sure-grip pressure downwards and sideways. Production departments and toolrooms find them handy time savers on planers, radial drills, shapers, milling machines, surface grinders, boring mills and lathes.

Write for Bulletin 140A and specifications.

RIVETT LATHE & GRINDER, Inc.

BRIGHTON · BOSTON · MASS · U S A

RIVETT

Model B Lock Jaw on horizontal boring mill.

the *Cone Reporter notes that—*

Conomatic Progress Reporter

American Bosch Corp. has a diesel injection pump in which a single plunger and valve do the work of four or six.

Progress with Conomatics

Trouble free, profitable Conomatics are easy on your muscles and easy on your nerves. Take a holiday from worry with a Conomatic on the job.

Conomatics for *Progress*

W. G. Bickley of Imperial College, London, offers a new series of number symbols to speed the work of electronic computing machines.

Progress with Conomatics

Buffalo Niagara Electric has a new 150,000 horsepower transformer that is said to be the largest in the country.

Conomatics for *Progress*

Continental Die Casting Corp. of Detroit has found a way to combine gold and chrome plating on a single piece of metal.

Progress with Conomatics

Glenn L. Martin Co. has developed the airplane hydraulic brake for automobile use.

A new searchlight for Coast Guard cutters projects 32 million candlepower from a 900 watt mercury light source that is no bigger than a kitchen match.

Conomatics for *Progress*

The Custer channel wing plane has been successfully flight-tested and is to be made by National Aircraft Corp., Hagerstown, Md.

Progress with Conomatics

A new movie screen that is a section of a sphere and can be made to fill half the wall space of a theater has been patented. The rights have been assigned to Vitarama Corp.

Conomatics for *Progress*

Toledo Scale Co. has a new line of computing scales adapted to the present day price ranges of groceries.

Progress with Conomatics

Heil Co. of Milwaukee has a new dump truck with 18½ cu. yds. capacity.

LeTourneau's new bulldozer, said to be the world's largest, weighs 93,000 pounds, has a 750 h.p. engine, and seven-foot tires.

Conomatics for *Progress*

This winter bus operators may have a heater made by Petroleum Heat & Power Co. of Stamford, Conn., that will keep cooling water from freezing at night, pre-heat the engine and warm the interior.

Progress with Conomatics

The Conomatic frame construction is one reason why Conomatics operate at lower cost. The frame was not "inherited", it was designed. The short, well proportioned, upright frame members give better support to the tooling area than do taller, less rugged upright members of competitive machines.

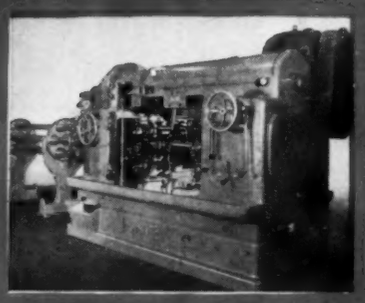
Conomatics for *Progress*

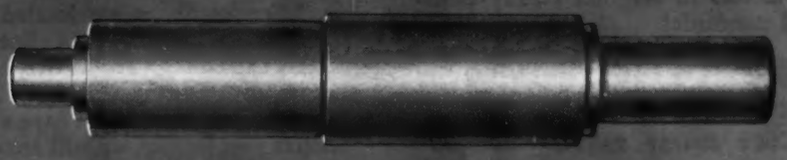
The world's most powerful electrostatic accelerator will be constructed for the Los Alamos Scientific Laboratory of the University of California.

Progress with Conomatics

Minnesota Mining & Mfg. Co. has a new tape of adhesive that is said to bond metals, fiber, wood or plastics with a sheer strength up to 3,500 p. s. i.

put *Usual* jobs on *any* Automatic
put *Tough* ones on a CONE





The transmission shaft shown is made from hot rolled molybdenum steel by a 3½" Six in 71 *seconds*.

CONE AUTOMATIC MACHINE CO., INC.
WINDSOR, VERMONT, U.S.A.
55

SPECIFY "ALLIS-CHALMERS" FOR—

"Certified" Motor Service!

Independent Local Repair Shops Now Being Selected to Give Better, Faster Service — "Certified" Parts and Workmanship—on Allis-Chalmers Motors— Transformers — Controls — and Pumps!

THE NAME "ALLIS-CHALMERS" has always meant good motors, generously built for long life! Now you have an *added* reason for investing in Allis-Chalmers motors . . .

BETTER SERVICE

Throughout the U. S. qualified motor repair shops are being selected and authorized as Allis-Chalmers *"Certified"* Service Shops. Each will have trained personnel as well as complete facilities for servicing and repairing Allis-Chalmers motors to original factory-established standards!

"CERTIFIED" Service Benefits You These Ways:

YOU GET FINEST PARTS. *"Certified"* Service Shops use genuine Allis-Chalmers repair parts — or parts of equal quality! Each shop is given complete service information, including factory procedure and drawings, if necessary. Result: factory-like workmanship!

YOU GET FINEST SERVICE. Every Allis-Chalmers *"Certified"* Service Shop has been selected on the basis of its excellent reputation in the community. It's the kind of shop you *like* to do business with!

How To Get Allis-Chalmers "CERTIFIED" Service:

Right now most Allis-Chalmers *"Certified"* Service Shops are located in the larger U.S. industrial areas. But they're rapidly expanding. For service, call your nearby A-C District Office, or Authorized Dealer. If we do not have a Service Shop in your locality, we will recommend the one closest to you. A 2498

ALLIS-CHALMERS, 999A SO. 70 ST.
MILWAUKEE, WIS.

NEW MOTORS AVAILABLE!

Many Sizes and Ratings of Allis-Chalmers Standard Squirrel-Cage Motors from 1 hp up are Now Available from Stock. Call Your A-C Authorized Dealer or District Office.

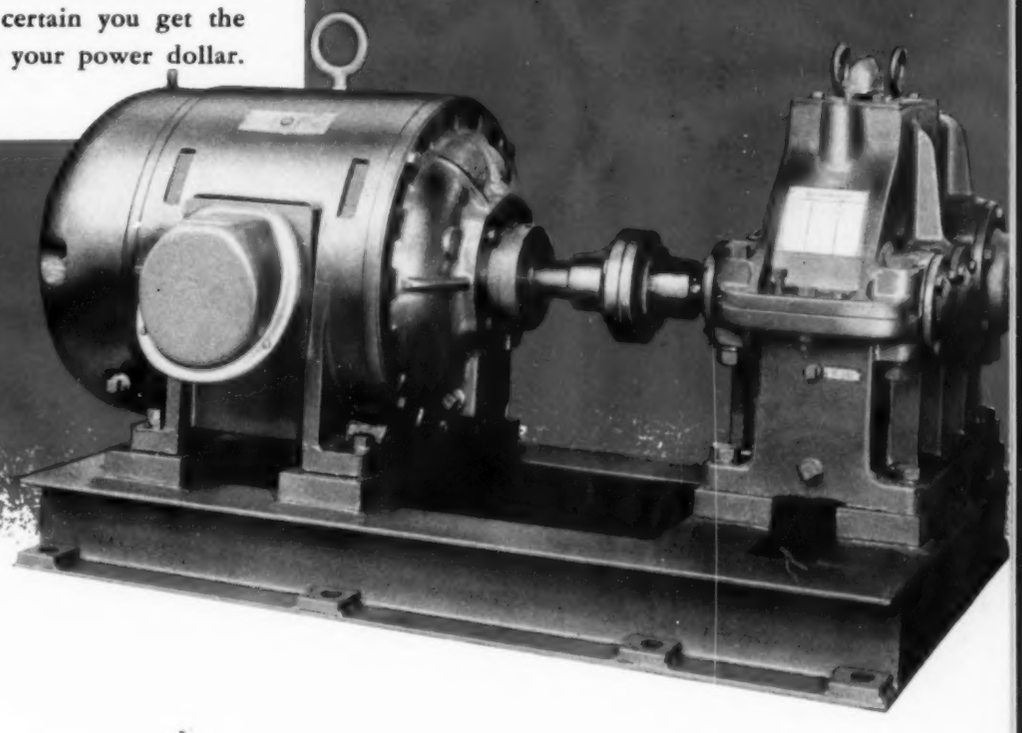
ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

USE THIS ONE SOURCE

FOR YOUR RPM REQUIREMENTS

Westinghouse offers the way to simplify your geared drive problems . . . to prevent headaches, save money, assure *more productive power.* Let Westinghouse geared-drive engineers take the responsibility for application, installation and performance . . . make certain you get the most in applied power for your power dollar.



FOR DRIVES UP TO 1,000 HP . . . USE WESTINGHOUSE SPEED REDUCERS—

For drives from 75 to 1,000 hp, speed reducers have no equal . . . and, in some instances, they're the best answer for drives below 75 hp, particularly when the prime mover is Diesel, gasoline or steam powered . . . or when existing installations dictate a separate speed-reduction unit. Westinghouse Speed Reducers are compact, fit closely to the machines they serve, have power efficiencies averaging 96% to 98%.

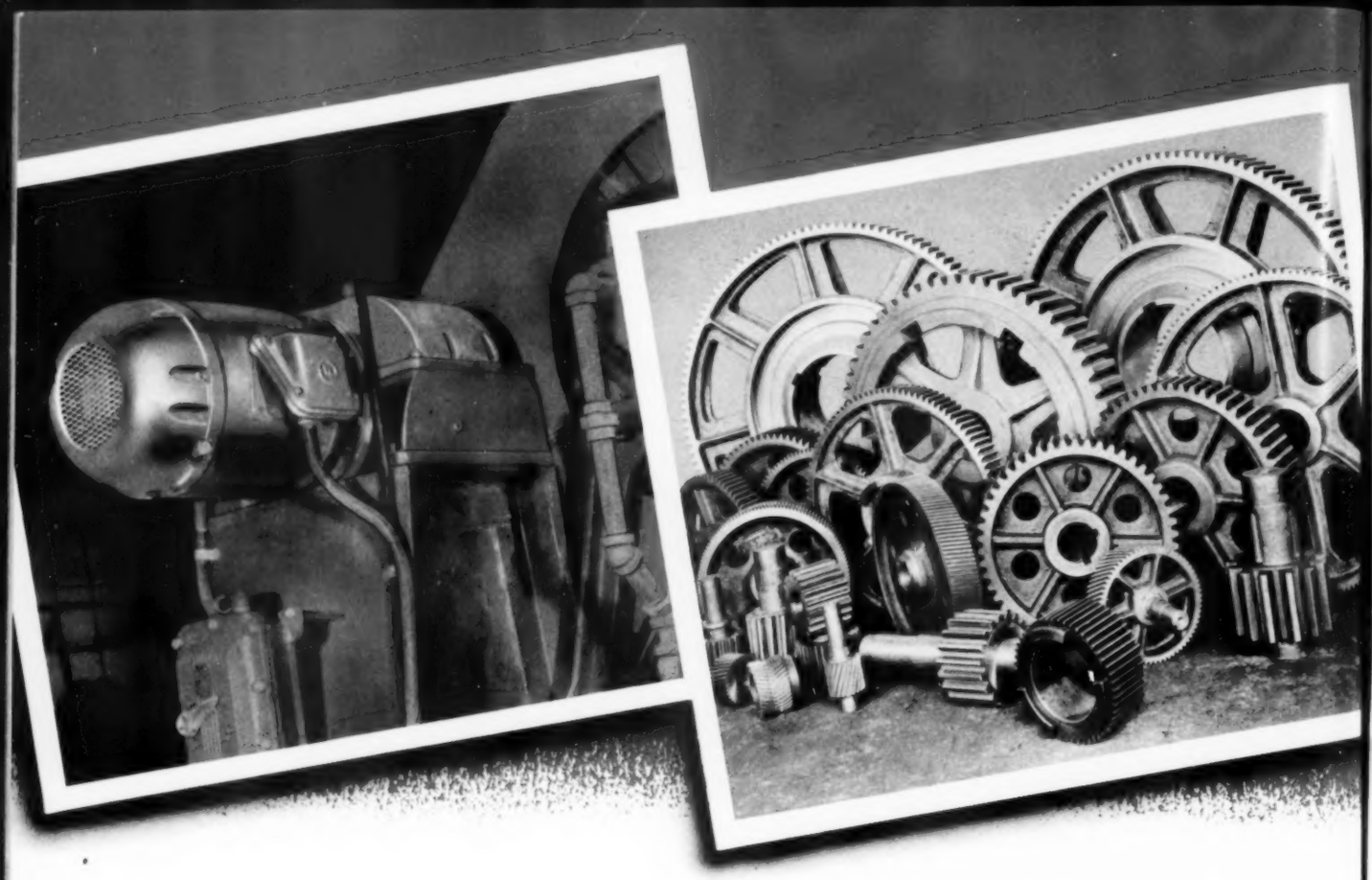
Continuous, trouble-free operation is assured by simplified design, exclusive Westinghouse BPT heat-treating of gears and pinions, positive lubrication and accurate construction.

A range of 28 standard ratios . . . from 2.82 to 70.5 . . . makes proper selection easy, and simplifies ordering and installation.

MEMBER OF AGMA WESTINGHOUSE

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE



FOR DRIVES TO 75 HP,
USE WESTINGHOUSE GEARMOTORS—

Westinghouse Gearmotors are today's best answer for obtaining speed reduction on drive applications from 1 to 75 hp.

In addition to providing speed reduction efficiency averaging 96 to 98%, they increase work-flow through savings in floor space . . . provide greater flexibility of machine arrangement, permitting better co-ordination of functions. Maintenance is reduced . . . drive hazards are eliminated as no moving parts are exposed. Motor and reduction unit are attached directly to the driven machine . . . installation is easy.

LET WESTINGHOUSE SOLVE
YOUR INDUSTRIAL GEARING PROBLEMS—

Let Westinghouse geared-drive engineers save you the time and expense of figuring your open gearing requirements.

From application help to finished product, they are at your service.

Westinghouse has specialized facilities for the design, application and manufacture of spur, single-helical and double-helical gears . . . up to 10 ft. in diameter.

Prompt delivery can be provided in most types and sizes.

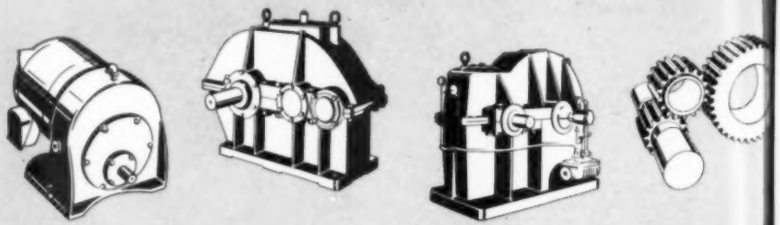
* * *

Depend on Westinghouse for help on your gearing problems. You buy undivided responsibility for design, manufacture and servicing of all electrical and mechanical components. Call your nearest Westinghouse office, or write for booklet B-3730. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-07263

Litho. in U.S.

Westinghouse

RPM FITTED DRIVES

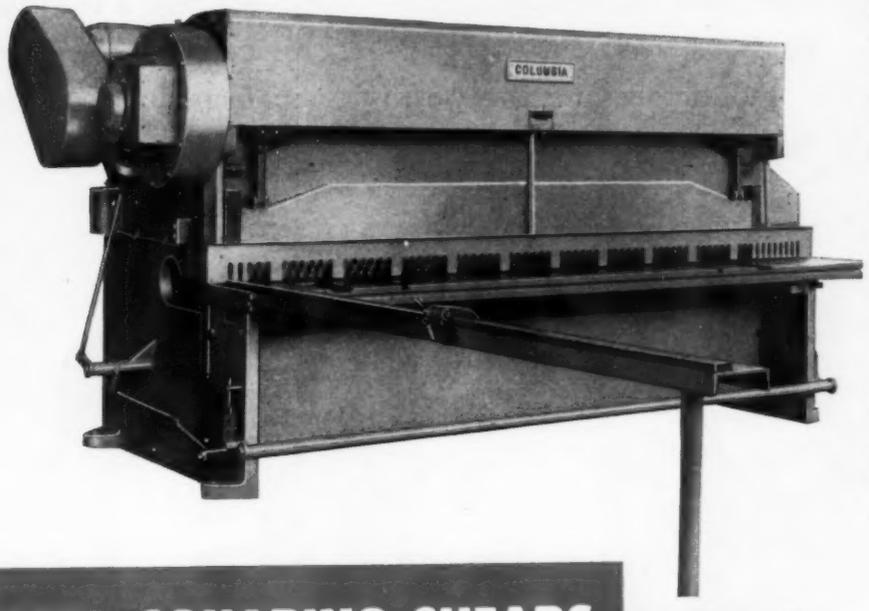


GEARMOTORS • SPEED REDUCERS • SPEED INCREASERS • INDUSTRIAL GEAR

for FASTER, MORE ECONOMICAL METAL SHEARING and BENDING

NOW AVAILABLE IN 9 SIZES

FOR SHEARING MILD STEEL UP TO ¾ IN. THICK.



Columbia Steel Squaring Shears are designed and built for fast, accurate shearing with low operating and maintenance costs.

Longer blades eliminate tearing or nicking when trimming or notching material of greater length than the blades.

Horizontal alignment of the upper blade is easily adjusted.

Rigid, welded, rolled-steel-plate construction, cut steel gears operating in oil, one-piece forged eccentric shafts of heat-treated high-carbon steel, stainless steel scales, centralized lubrication and positive, automatic holddowns with convex fingers to prevent scratching insure efficient, dependable operation.

STEEL SQUARING SHEARS

POWER PRESS BRAKES

Columbia

Columbia Power Press Brakes incorporate many advanced design features for speed, dependability, efficiency and economy—Slide adjustment is motor driven; slide operates parallel or non-parallel with base.

Other features include: positive friction clutch, high-efficiency friction brake, welded rolled-steel construction, low-deflection slide and base, cut steel gears operating in oil, one-piece heat-treated forged eccentric shaft, centralized lubrication and improved wedge-type release mechanism.

For forming mild steel from 4 ft. x 7/16 in. to 12 ft. x 1 in.

Write for Bulletin 106A.

COLUMBIA MACHINERY AND ENGINEERING CORPORATION

ONE OF AMERICA'S LARGEST MANUFACTURERS OF STEEL SQUARING SHEARS

HAMILTON, OHIO

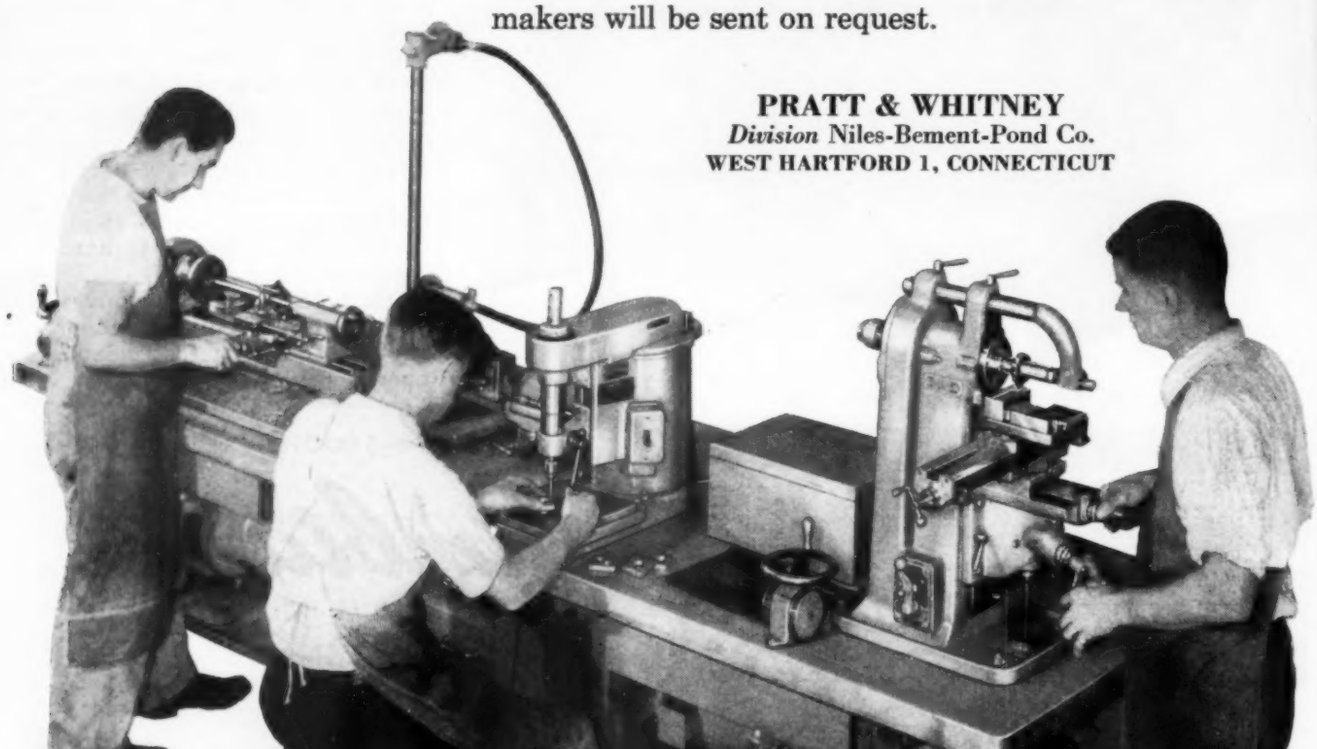
Good men and good tools ought to be together

It takes a world of skill, experience, and ingenuity to make a good toolmaker. It takes the best of precision equipment to make his ability pay off.

That's why so many able toolmakers feel that P&W Precision Bench Machine Tools are as important to their craftsmanship as their sensitive fingers and sharp eyes. When these machines are readily accessible within a few steps of a toolmaker's bench, they are great savers of high-rated time. Important, too — they represent a relatively modest investment that pays real dividends.

Full details on these worthy companions for good toolmakers will be sent on request.

PRATT & WHITNEY
Division Niles-Bement-Pond Co.
WEST HARTFORD 1, CONNECTICUT



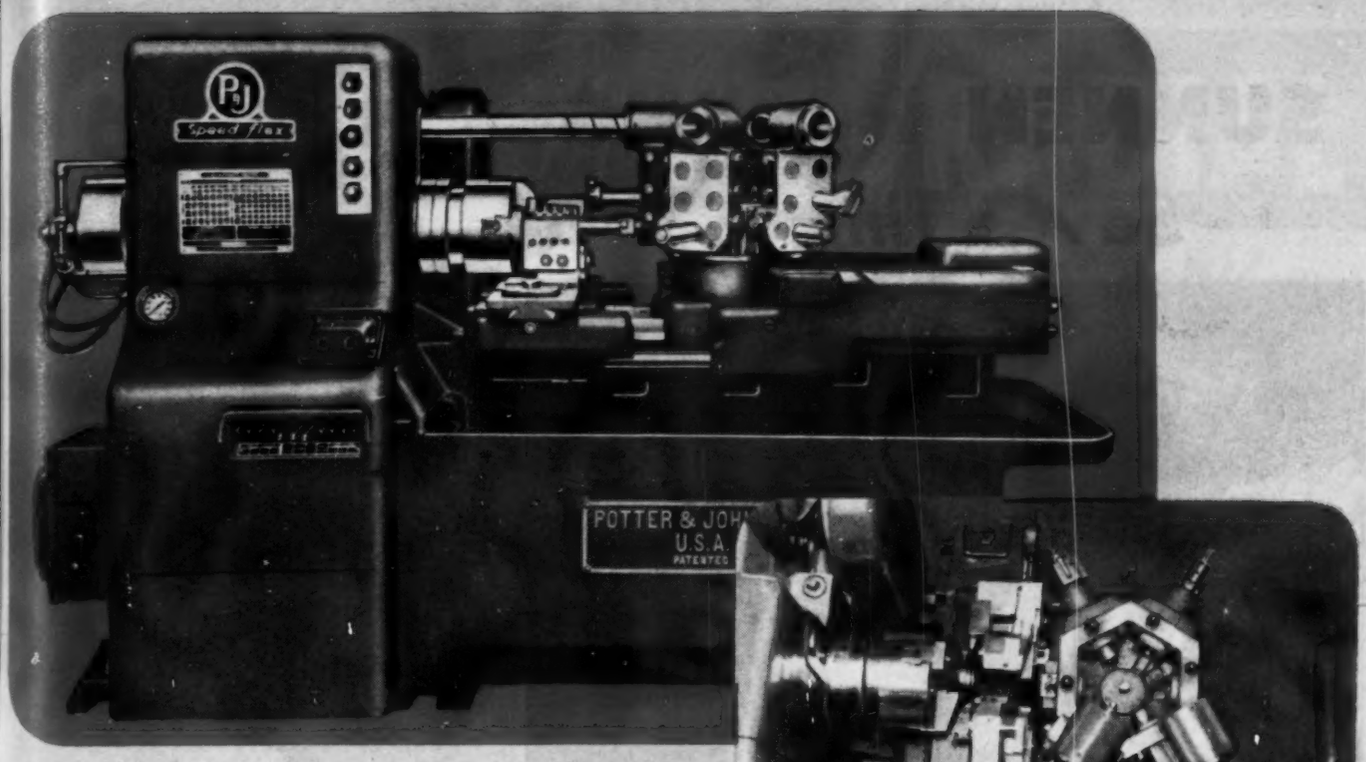
Here's a precision unit that takes very little space. The line-up, left to right: P&W Model "C" Bench Lathe, Keller-flex Drive Unit for Tool Post Grinding Attachment, Sigourney Sensitive Drill (sold by P&W), and P&W Model "C" Universal Bench Miller. In toolroom or experimental department, this self-contained "island" can handle lots of fine work. Available in any desired size and machine combination. Ask for information.

ACCURACY IN A NUTSHELL

Pratt & Whitney Bench Machine Tools

LATHES • DRILLS • MILLERS

"THERE IS NO BETTER-PAYING INVESTMENT THAN THE RIGHT TOOLS FOR THE JOB"



Tooling Flexibility Contributes to Fast Work on this

P&J 3U SPEED FLEX

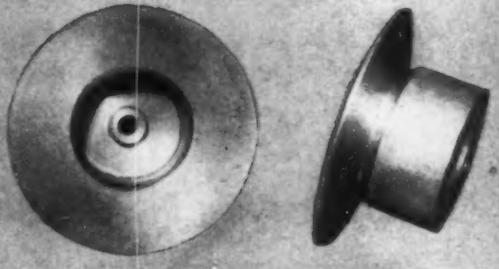
Floor to Floor Time 2.85 minutes

DESIGNED and built for small duplicate parts production at fast speeds, and tooled for the job, the 3U SPEED FLEX (P & J's latest and smallest automatic turret lathe), is making outstanding performance records. The job shown here—a cast iron fan hub—is a typical example.

The special tools mounted on the front and rear cross slides are the most interesting part of this setup. The subject has an angular flange which requires taper facing. This taper facing is accomplished through the medium of a castellated bar which is actuated in a line parallel to the axis of the spindle, as the cross slide feeds into the work in a line at right angles to the axis of the spindle. The correct form of the angular flange is secured by means of a follower on the castellated bar and a former held in a fixed position by means of the bracket stud and adjusting nuts attached to the base of the cross slide.

On work of this character, using an air chuck for holding the work, one operator can readily handle three machine units.

Why not consult P & J Methods Engineers on your production needs?



DETAILS OF JOB

Part: **Fan Hub**

Material: **Cast Iron**

Method and Operation: **Presenting hub end to spindle, grip on same with 3 chuck jaws.**

Machine as follows:

1st. **T.F.: Drill hole 8 mm. dia. through; spot face hub; bore approx. 60 mm. dia. x ⅛" deep at open end.**

2nd. **T.F.: Turn flange O.D.; bore 56mm. dia.; turn 19mm. dia.; face web at bottom; chamfer 12.5 mm. dia. at hole.**

3rd. **T.F.: Rough and finish face both sides of angular flange; form radius on O.D. of flange.**

4th. **T.F.: Finish drill hole; face and chamfer hub; form radius at open end.**

5th. **T.F.: Ream hole.**

Floor-to-Floor Time: **2.85 min. (average)**

POTTER & JOHNSTON COMPANY
PAWTUCKET, RHODE ISLAND
Subsidiary of
Pratt & Whitney
division Niles-Bement-Pond Company

SUNNEN HONING

Saves Time...

Steps Up Production of Shift Forks...

at Spicer Mfg. Div. of Dana Corp., Toledo, Ohio

Areas on these parts are induction hardened — and the hardening creates high spots and distortion which must be removed.

Surfaces are too hard to ream or to broach, but Spicer engineers found the answer when they turned to Sunnen Honing. Sunnen honing stones removed the metal quickly and at much lower cost than by any other method.

Even on parts with slotted diameters, Sunnen Honing produces straight, round holes — with fast rate of stock removal.

Here are other reasons why hundreds of industrial plants are using Sunnen Precision Honing Machines —

- **Wide Range—hones diameters from .120″ to 2.625″. Open or blind holes and bores with keyways**
- **Hones All Metals, Ceramics, Glass — steel, cast iron, bronze, brass, aluminum**
- **Accuracy Within .0001″ Guaranteed — corrects out-of-roundness and distortion. Produces straight, round holes**
- **Produces Any Micro-inch Finish Required — no high spots or chatter marks.**

Write for bulletin XSP-5 or, on request, a Sunnen engineer will be glad to show you the advantages of using Sunnen Honing in your plant.

-381

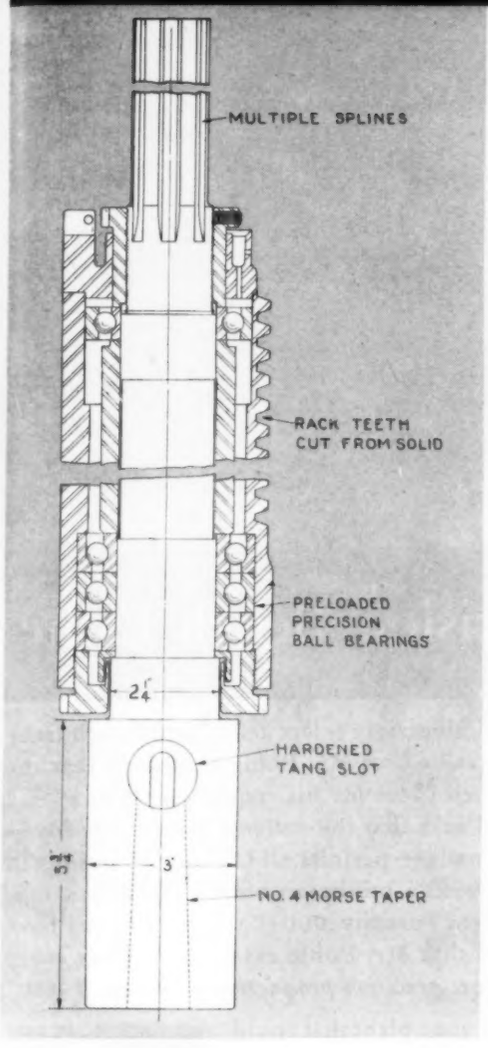
SUNNEN PRODUCTS CO. 7933 Manchester Ave., St. Louis 17, Mo.

Canadian Factory: Chatham, Ontario

SUNNEN HONING

"Low-cost production of precision holes"

GILBERT *Multi-Duty* RADIAL



Displays Modern Spindle Design FOR STIFFNESS AND ACCURACY

● On most radial drill work, the spindle is extended from the head. The spindle must resist the terrific bending action caused by improperly sharpened drills and the strains of boring applications where depth of cut is uneven in addition to the normal thrust of feeding.

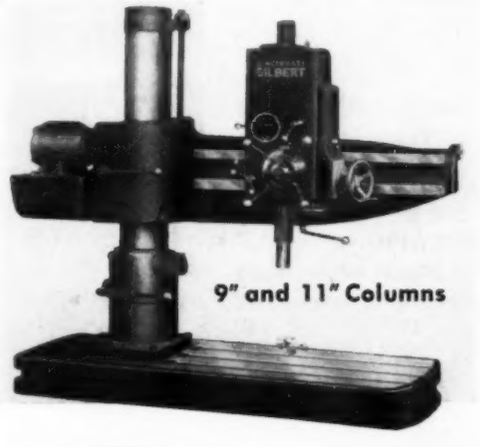
The Gilbert spindle, designed for radial drill work (including the use of multiple spindle heads) gives rigid support against thrust and radial load.

The spindle is fully supported by the bearings in its 4¼" diameter alloy steel quill. The quill has a 12 inch long bearing in the head.

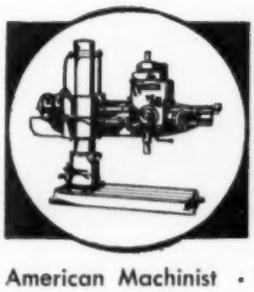
The spindle is mounted in the quill with three ABEC #5 precision preloaded angular contact bearings at the bottom and one bearing at the top. This design guarantees long trouble-free life and accuracy even on extremely heavy duty work.

The spindle nose can be supplied with a #4 or #5 morse taper. The nose is equipped with a replaceable hardened tang slot.

For maximum performance from modern tooling, use a Gilbert Multi-Duty Radial.



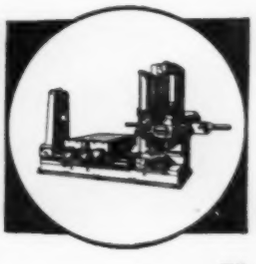
9" and 11" Columns



THE CINCINNATI GILBERT MACHINE TOOL CO.

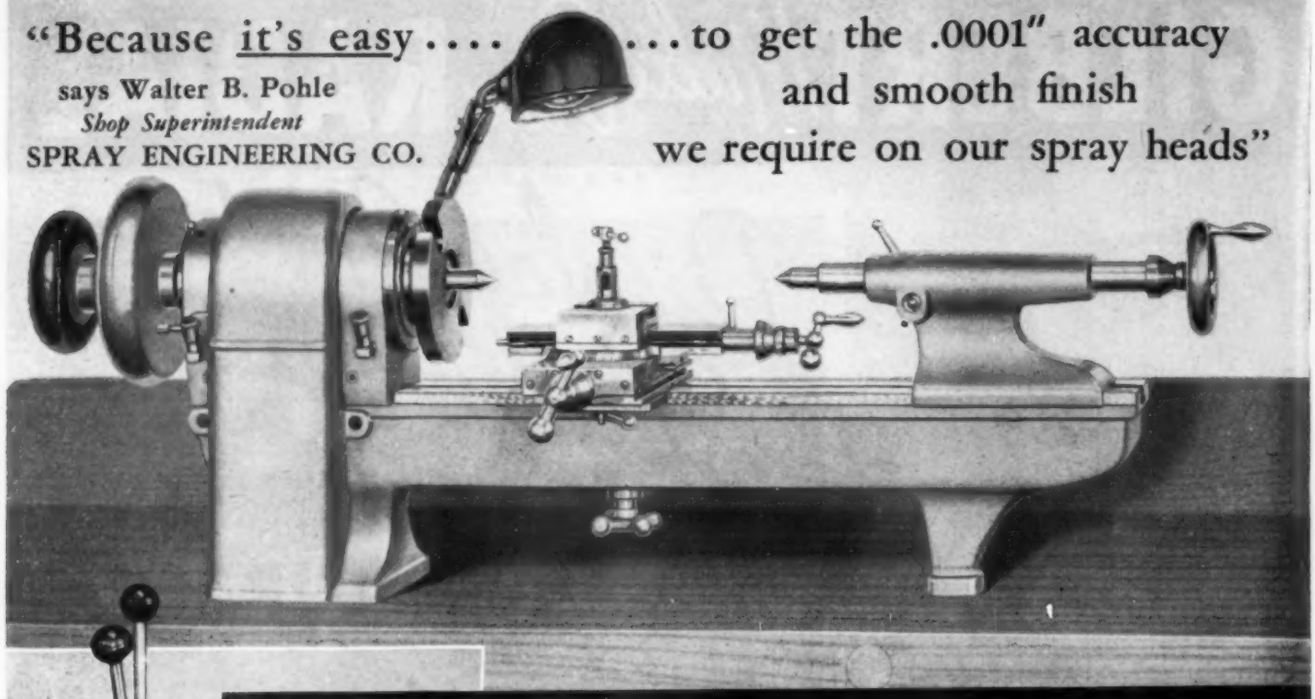
3360 BEEKMAN ST. • CINCINNATI 23, OHIO

RADIAL DRILLS . . . HORIZONTAL BORING MILLS



"Because it's easy . . . . . to get the .0001" accuracy and smooth finish we require on our spray heads"

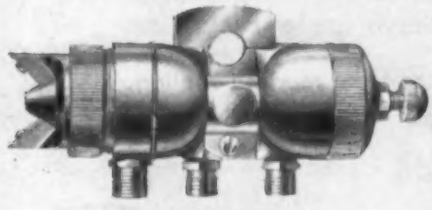
says Walter B. Pohle
Shop Superintendent
SPRAY ENGINEERING CO.



Wade Standard Precision Bench Lathe

Spray Head
(actual size)

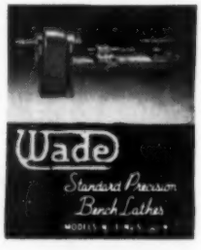
Perfect alignment of the spraying elements is essential, to assure the uniform spraying characteristics of the Spraco Automatic Spray Gun. To obtain this perfect alignment requires truly accurate machining of many surfaces on the spray head. Tungsten carbide tools on the Wade Standard Precision Bench Lathe furnished the answer here!



Gun body assembly

It isn't often that a shop will deliberately select a standard bench lathe for an exacting finishing operation, but Mr. Pohle explained that the Wade Standard Precision Bench Lathe fits his requirements to a "T". He has a battery of them, and says that the *extreme spindle rigidity* — under both radial and thrust loads — permits all O.D.'s and facings to be very accurately machined with a minimum number of chuckings. Although the tolerances are close (usually .0001") the operators have so little trouble meeting them that Mr. Pohle says, "I get what every shop superintendent strives for: *precision production at low unit cost!*"

Perhaps you have a situation in your plant that could be straightened out by the installation of one or more of our Standard Precision Bench Lathes. It won't cost you anything to investigate!



Write today for illustrated folder describing this profit-producing lathe, and its accessories,

free on request . . .

SPECIFICATIONS

	No. 3	No. 5	No. 7
Swing over Bed	7"	7"	7"
Distance between Centers	17"	15"	14"
Collet Capacity	½"	¾"	1"
Taper Standard for Centers	#1 Morse	#2 Morse	#2 Morse
Tailstock Spindle Travel	3¼"	3¼"	3¼"
Tool Shank Section	5/16" x ½"	5/16" x ½"	5/16" x ½"

THE WADE TOOL CO., 53 River St., Waltham 54, Mass.

This is another example of how you can

WADE into your work with a Wade

RHINO TOUGH or BUNNY SOFT...

There's a Pittsburgh Power Driven Brush for every Industrial Use!

- GLASS
- STEEL
- PLASTICS
- AUTOMOBILE
- RUBBER
- PAPER
- TIRE & RETREADING
- SHOE MANUFACTURING & REPAIRING

In the complete Pittsburgh line are brushes of all types—specifically designed to meet your particular finishing requirements.

Pittsburgh brushes are *tough.* They're stiff enough to resist abrasions or they're soft enough to improve surface texture. And the carefully controlled distribution of the brushing stock gives perfect balance to these brushes.

They're made to do your job right. They're made to provide top efficiency, enduring economy.

Consult your Pittsburgh engineering representative today. He'll be glad to help you work out your problems by developing any type of power-driven brush needed.

FREE!

Steel rule and depth gauge, 6", complete with pocket clip, and atttractive leather case. Yours for the asking . . . write on your Company letter head to Pittsburgh Plate Glass Company, Dept. W-3, Baltimore 29, Md.

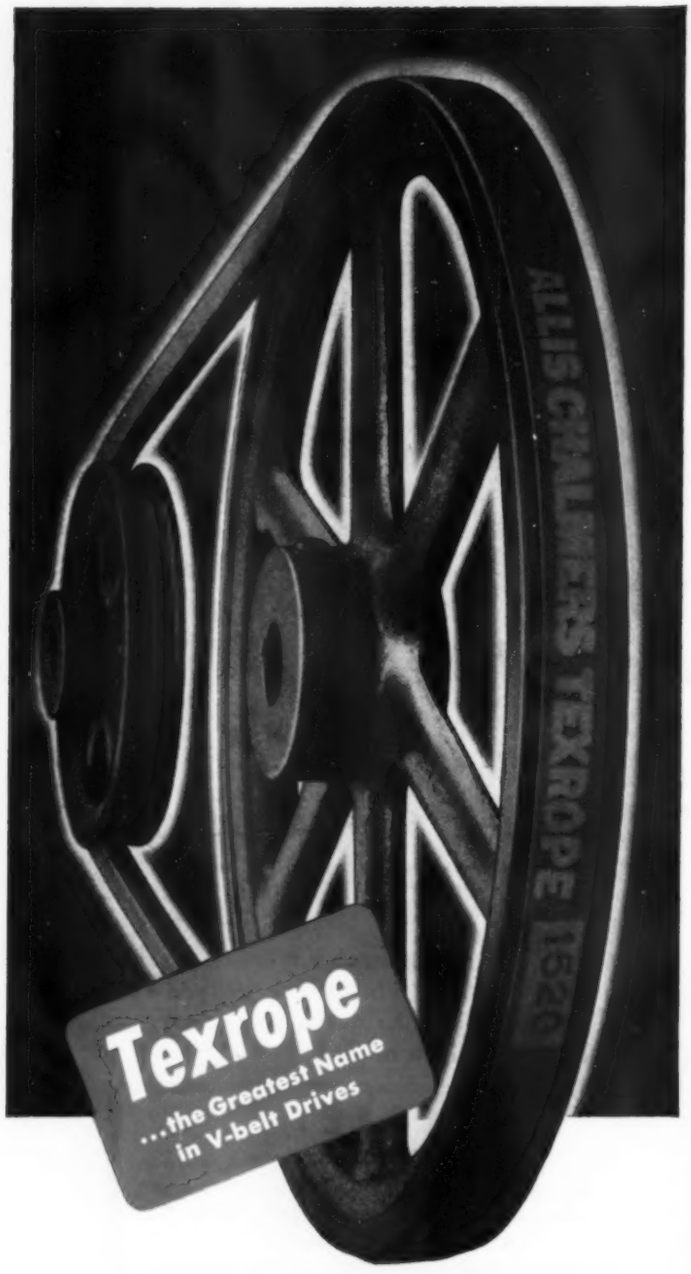
Power Driven BRUSHES

BRUSHES · PAINT · GLASS · CHEMICALS · PLASTICS

PITTSBURGH PLATE GLASS COMPANY

TEXROPE F/HP Drives

- "ENGINEERED" FOR INDUSTRY!
- AVAILABLE NOW!
- CARRY THE NAME "TEXROPE"... AND OVER 25 YEARS OF EXPERIENCE!



IF YOU'RE IN THE MARKET for fractional horsepower V-belt drives, here are good reasons for investing in TEXROPE — the greatest name in V-belt Drives. 1) They're "engineered" — selected and applied to suit the exact characteristics of your drive. 2) They're in stock at Authorized A-C Dealers or available promptly through A-C District Offices, and 3) They're backed by the greatest collection of V-belt drive experience and facilities of any company in this business.

TEX-IRON F/HP SHEAVES

High density cast iron. Accurately bored for easy fit with tight shaft grip. Precision grooved for non-slip power and longer belt life. Carefully balanced for vibrationless operation at all speeds.

TEXROPE F/HP V-BELTS

Best known name in V-belts. Carry full rated load with plenty of overload and shock load capacity. Molded to fit sheave groove and grip tightly without excess wear or wasted power. An ideal teammate for Tex-Iron sheaves. Highly efficient on present sheaves, too.

The complete range of Tex-Iron sheaves from 2 to 15 inches PD and Texrope V-belts to match are now available from your dealer's stock. Call him today. Texrope, Tex-Iron, Super 7, Texsteel, Magic Grip and Vari-Pitch are Allis-Chalmers Trademarks. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 2510

A Complete Range of Products

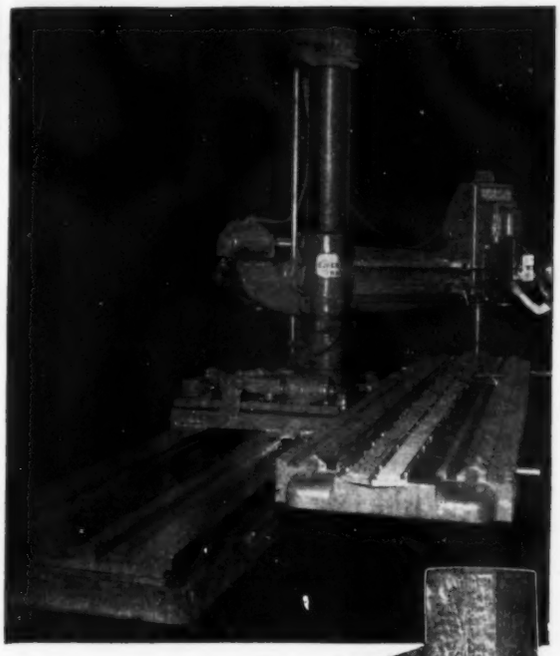
Super-7 V-belts	5 types . . . sizes to suit every power transmission job	
Texsteel, Texdrive, Magic-Grip	Sheaves in a full range of sizes and grooves	
Vari-Pitch Sheaves	Exact variations in speed — Stationary or Motion control	
Speed Changers	Speed variations up to 375% at the turn of a crank	

SEND TODAY for Allis-Chalmers 44 page book No. 20B6249A describing Texrope F/HP V-belt drives — the Fractional Horsepower Drive that's "Engineered" for Industry. Result of years of experience in engineering FHP V-belt drives. Shows you simple, accurate way to select FHP sheaves and belts. Every FHP drive user should have a copy.

Texrope Super-7 V-belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices.

ALLIS-CHALMERS

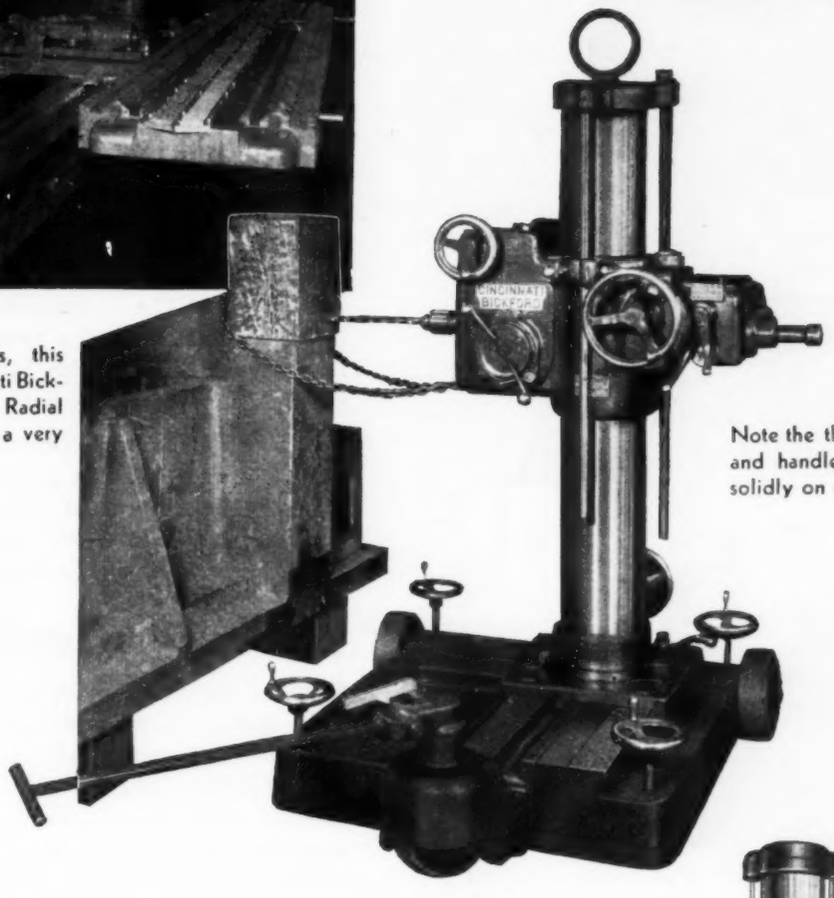
Originators of the Multiple V-belt Drive for Industry



Profitable Applications

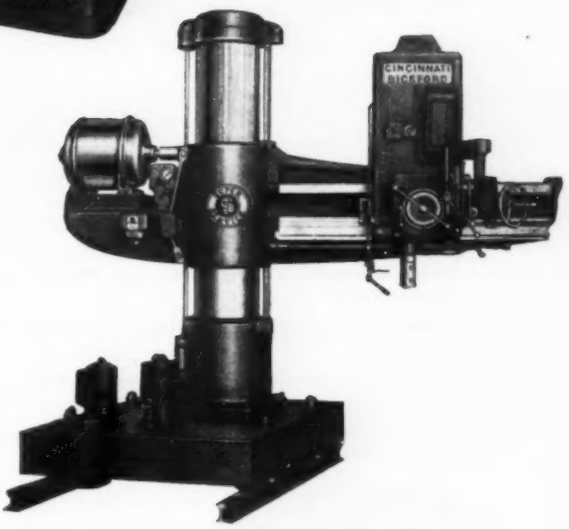
of Traveling BICKFORD Radial Drills

Mounted on ways, this sliding base Cincinnati Bickford Super Service Radial Drill is working on a very long casting.



Note the three-wheel base is easily moved and handled—in operation the base rests solidly on 4 leveling screws.

Moved by power, this track mounted Cincinnati Bickford Super Service Radial Drill has an unusually heavy base, rolling on hardened steel wheels.



When it is an advantage to move the drill to the work, Cincinnati Bickford Super Service Radial Drills, in various sizes and styles, are equipped for this service.

The "Portable Horizontal" is an inexpensive, 100% mobile machine, and offers great advantages on work within its range.

Powered with a 1½ horsepower motor, the base is equipped with leveling screws and built-in levels. Very handy; is easily rolled along the floor or moved by crane.

Large, cumbersome castings are being profitably handled by Cincinnati Bickford Super Service Radial Drills.

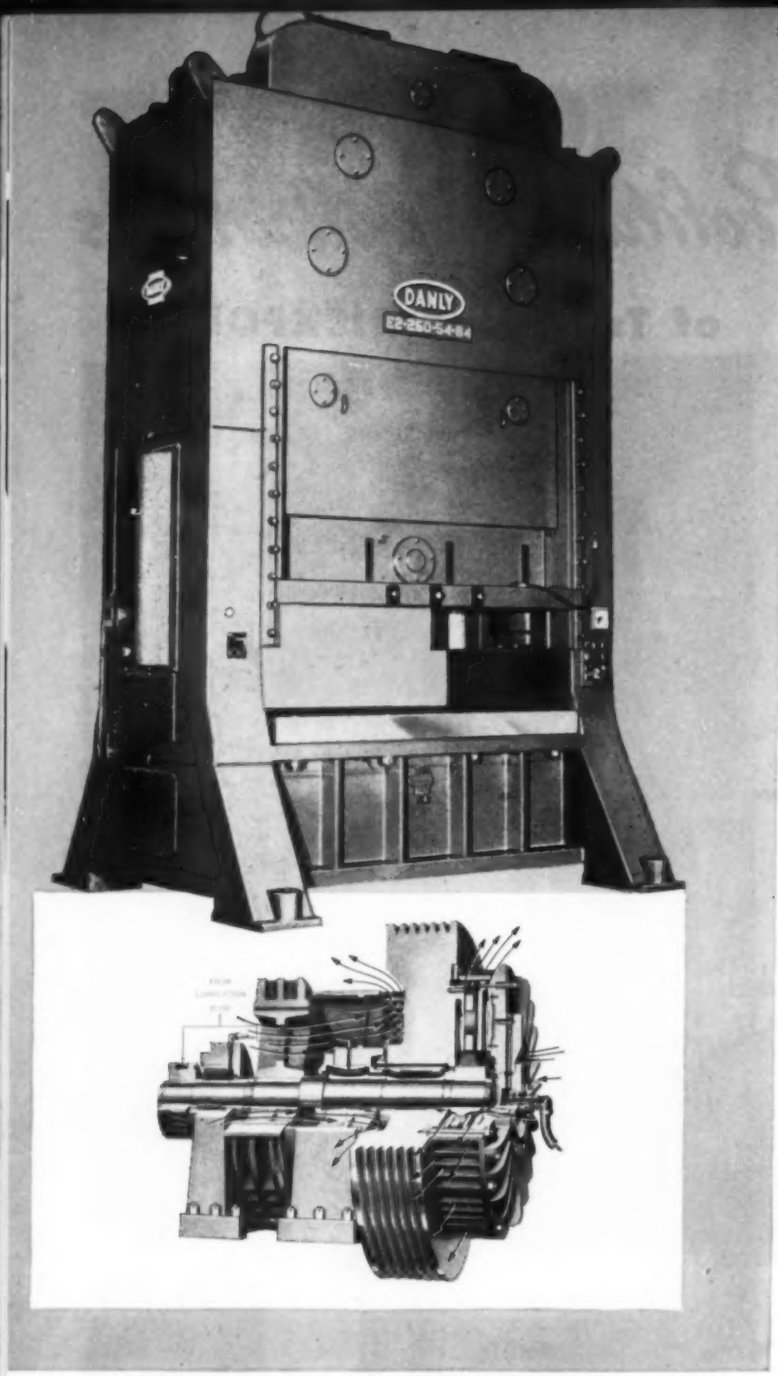
Write for Bulletin H-R, on the Horizontal Radial, or let us consult with you on your drilling problems on large castings.

See our Condensed Catalog in Sweet's File.

Equal Efficiency of Every Unit Makes the Balanced Machine.

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO. **Cincinnati 9, Ohio U.S.A.**



NEW DANLY CLUTCH INCREASES PRESS PRODUCTION BY CUTTING DOWNTIME

Main Mass of Clutch Rotates with Flywheel

Vastly different from conventional press clutches, most of the mass of the Danly Clutch is assembled directly to the flywheel. The actual weight of clutch members "picked up" by the flywheel in the clutching operation is about 1/7 that of ordinary clutches. The comparatively light weight of the parts started by the flywheel upon engagement reduces the load on the motor and driveshaft. Accordingly, less heat is generated.

In addition, solid friction discs are used which have a greater wearing surface than riveted linings. *In tested operation under load, more than 8,000,000 successive clutch engagements failed to make replacement of the original discs necessary.*

High Velocity Ventilation

Further, the clutch housing is designed to provide high velocity ventilation, which together with the automatic built-in lubricating system providing filtered oil to all drive shaft members, insures long trouble-free service, less downtime and more production at lower costs.

5 Cost-Saving Features of DANLY PRESSES

Built-In Automatic Filtered Oiling System—Puts right amount of oil where needed—*including flywheel bearings.* Increases press life—conserves oil.

Sturdy All-Steel Welded Frame—All weldments stress relieved before machining—insures accurate, permanent alignment.

Safe, Convenient Electrical Controls—Save time on die adjustments—increases operator safety.

Extra Long, Bronze-Lined Adjustable Gibs and Precision Machined Slide—Assure long operating precision.

Pitman Wrist-Pin Design—Permits precision fitting of component parts, assures closer operating tolerances, and continuing alignment.

Get More Facts Today on Danly's Cost-Saving Features

Write for this free folder. Ask for facts on other Danly engineering features. Danly Presses are available in a range of capacities of 50 to 3,000 tons.

Engineering Service

Call on Danly engineers for assistance in determining the most efficient press for your production. For specific information, send details about your problems. No obligation.

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52ND AVENUE CHICAGO 50, ILLINOIS

25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

PRECISION DIE SETS...STANDARD AND SPECIAL • MECHANICAL PRESSES AND PRESS EQUIPMENT

SPOT NEWS OF METALWORKING

Phantom orders may be placed for many items besides machine tools. NSRB is now studying gages, abrasives, cutting tools, mechanical and hydraulic presses, materials-handling equipment, industrial furnaces and ovens, foundry equipment. In the "thinking" stage for phantom (pool) orders are antifriction bearings and woodworking equipment.

New cast iron alloy, inoculated with 0.05% magnesium, has strength of cast steel (80,000 to 100,000 psi), stated Charles K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala., at Michigan State College foundry conference Oct. 1. Machinability is not sacrificed with increase in strength. Numerous problems must be overcome, however, before production begins.

Herbert L. Tigges, executive vice president Baker Brothers, Inc., Toledo, has been named director of Machine Tool Division of Office of Production, NSRB. F. T. Stone, president Columbus McKinnon Chain Corp., will serve as director of materials-handling equipment, mechanics hand tools and light power tools.

Ford is making its own diamond dressing tools by a powder metallurgy principle based on the hot-press technique. It can produce 300 tools a day at one-fourth the cost of sending them out for remounting worn stones. Even more important is avoidance of production delays.

Pratt & Whitney has developed an aircraft engine combining force of a propeller with boost of a jet. New unit will team up conventional 28-cylinder P&W engine with a General Electric turbo-supercharger jet. Result: Boeing B-54 bombers will be able to fly farther, faster and higher.

An "air lift" is delivering 5000 lb. of parts and materials a day from manufacturers' plants to Oakland, Calif., General Motors' factory. Regular airline and chartered planes are used. This emergency freight permits plant to maintain 40-hr.-week schedule.

First postwar M-Day strategic concept for next emergency has been delivered to Munitions Board and NSRB by Joint Chiefs of Staff. Mobilization planners now know what materiel will be needed immediately in emergency and can act accordingly.

Carbide tools cut cast iron at rate of 80 in. per min. at one spot in new Oldsmobile engine plant and at 56 in. per min. on another operation. Cylinders are bored at 9½ in. per min., the metal being removed at rate of 18 lb. per min. The plant has 300 special machines run by 800 operators. One operator controls a transfer machine with 18 separate work stations and measuring 86 ft. in length.

Drive to obtain more work for New York City tool and machine job shops has been started by Commerce and Industry Association of New York. Aim: (1) encourage large companies to place subcontracts, (2) get New York manufacturers to place more work locally, (3) secure armament work.

NLRB refused to interfere in collective bargaining dispute in small screw machine shop doing $95,000 business yearly, asserting business on interstate commerce "is too remote" to come under Taft-Hartley Law.

Elimination of polls prior to union shop contract negotiations under Taft-Hartley Law appears possible next year. Procedure is held too costly and has little meaning as 98 percent of elections are won by union. NLRB reports 133 union shop elections daily.

Gaging Metalworking

Though metalworking operations as a whole stay at a high level, an increasing spottiness is noted. Makers of automobiles and of many consumer products are limited only by the amount of steel at hand. But many small shops around the country—in the machine tool field, in the contract tool and die business, and in the job-shop class—are looking for orders.

There is an unbalance between companies. Plants with a lot of work ahead appear to be getting still more work; others with slack hours are finding it hard to capture new contracts. It would be much better for industry if current business were spread out more evenly. One way of distributing it, already resorted to, is for companies with an overabundance of work to farm out some of it to less fortunate firms.

Machine Sales Up

An upturn is reported in machine tool sales. And inquiries have never been larger, except in wartime. Some builders and distributors attribute the flood of inquiries partly to the psychological effect of "phantom" orders from the Armed Services. The best thing to do is to get needed machines while they can be obtained.

New tooling programs for peacetime products, however, account for much of the current bookings. General Motors has been placing some sizable orders. Included are orders for highly special machines for Chevrolet's new automatic transmission, which will be somewhat similar to Buick's. A large metalworking firm in northeastern Ohio is buying equipment for a new plant.

Steel Outlook Still Dismal

The outlook in steel is as dismal as ever. Users are feeling the pinch of reduced quotas for the fourth quarter in many items. Sheet and plate consumers are hit the worst. The fear is that pressure from Washington will compel mills to set aside an increasing ratio of tonnage for "essential" purposes as the months go by. Steel industry representatives have just agreed to allocate 10,000 tons of steel for shipbuilding both in January and February. Approval has been given to adding 2500 tons of sheets to the monthly quota of 29,170 tons of sheets for makers of warm air heating equipment. On the other hand, industry representatives have rejected government proposals to earmark 20,000 tons of steel a month for new "essential" programs.

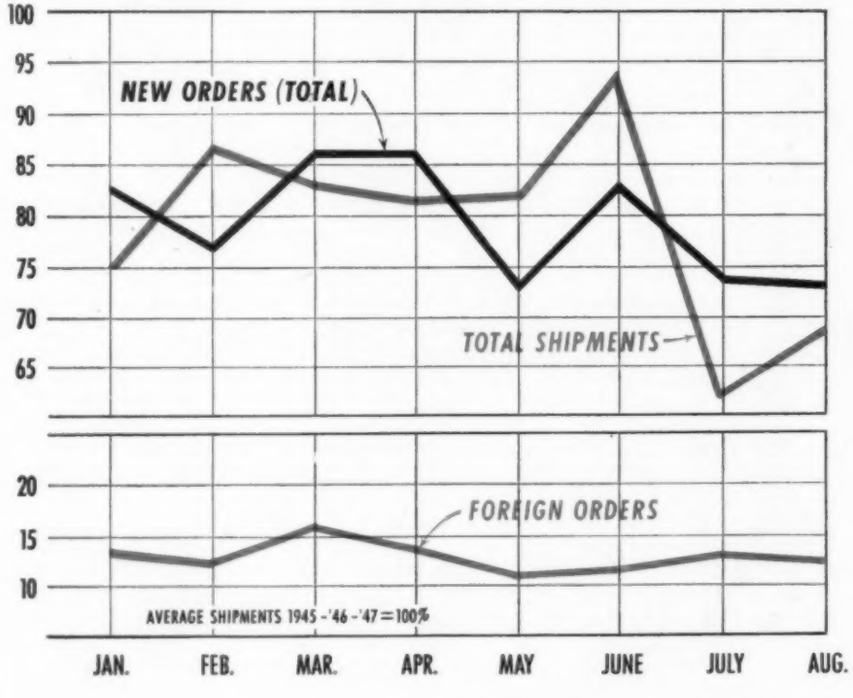
On top of the stepped-up demand is the possibility of a new boost in steel prices. Scrap prices are rising again; if a general increase should occur, it would likely touch off further finished steel price rises. An advance of $3 to $4 a ton in pig iron is spreading. Steel mills are viewing with anxiety the requested increase of 8% in rail freight rates, an increase which would hike the cost of coal and ore.

Engine Program Helps

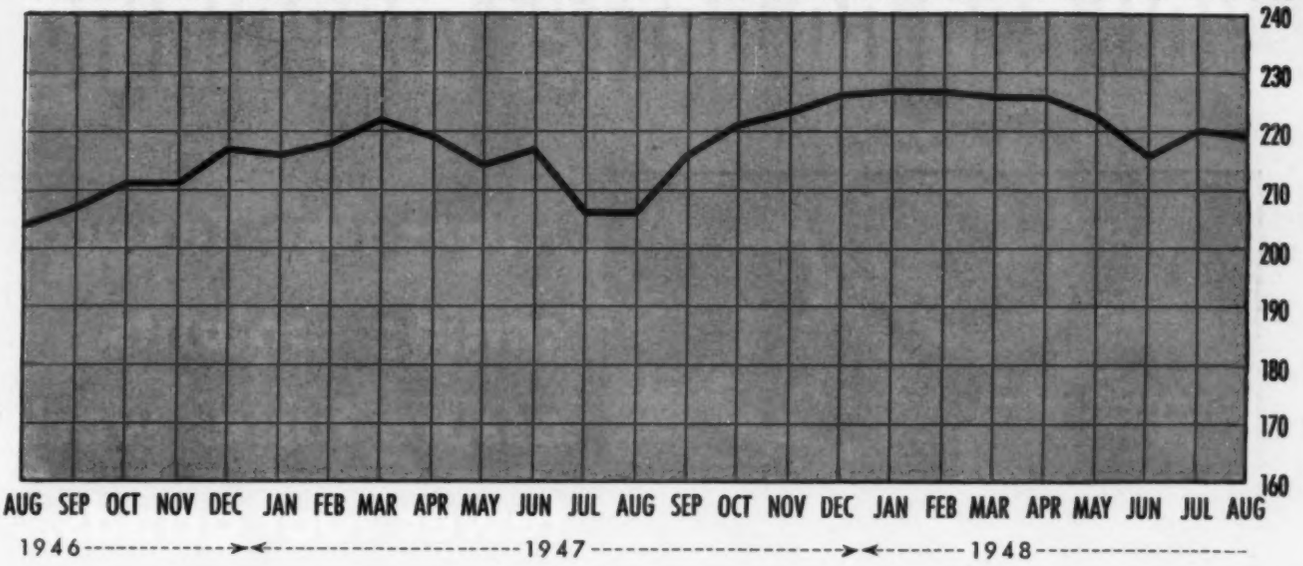
The aircraft engine program is yielding a modest amount of business to machine tool builders. One company is on the verge of closing an order for 30 machines for a subcontractor on a turbo-jet engine. Some

MACHINE TOOL INDEX SHOWS RISE IN SHIPMENTS

1948	NEW ORDERS (TOTAL)	FOREIGN ORDERS (INCLUDED IN TOTAL)	SHIPMENTS (TOTAL)
Jan.	83.1	14.0	75.3
Feb.	77.3	12.7	87.1
Mar.	86.3	16.1	83.6
Apr.	86.3	14.1	82.0
May	73.5	11.4	82.6
June	83.4	11.9	94.4
July	74.0	13.3	62.4
Aug.	73.6	12.7	69.2



American Machinist INDEX OF METALWORKING PRODUCTION



INDEX		COMPONENTS				
		MACHINERY	ELECTRICAL MFG.	AUTOS, TRUCKS	TRANS-PORTATION EQUIP.	OTHER METAL-WORKING
AUG. 1948.....	219	247	225	224	306	146
JULY 1948.....	220	250	226	229	305	147
AUG. 1947.....	206	233	224	206	259	142

AMERICAN MACHINIST'S INDEX OF METALWORKING is based on manhours worked in five segments, which are "weighted" as follows: Machinery, 32.5—Auto & Trucks, 22.6—Electrical Manufacturing, 15.4—Transportation Equipment, 12.4—All Other Metalworking, 17.1. Index figures are a percentage of 1939, which equals 100.

builders with idle capacity are not keen about filling it with contract work because they will need it if anticipated jet engine business should break.

The fact that inquiries are being converted into orders more quickly than a few months ago is an encouraging aspect of the situation. Prospective orders are fanning out beyond the small coterie of buyers who lately have been furnishing a substantial percentage of the total business.

Screw Products Boosted

Sharp increases in shipments and new orders are reported in the screw machine products industry during August, with backlogs unchanged. Compared with August, 1947, new orders more than doubled, with shipments about 90% greater. The month's figures were second best for the year, with March still at the top.

Tool, Die Work Steady

Tool and die business continues to run ahead of operations a year ago. August figures are reported slightly below July but still well ahead of the corresponding month of 1947 with the exception of sales invoices which were up. Employment showed a small increase over July.

In the automotive tool and die plants, however, backlogs are dwindling from the peaks of recent years and a further slump is expected the coming winter. The long-range outlook is reported bright. Eventual tooling for smaller cars is anticipated. Labor supply in the Detroit area is ample.

Appliance Output Heavy

Production of electrical appliances will probably match 1947's record-breaking dollar volume this year and the industry expects to maintain the pace through 1949 by means of aggressive selling campaigns.

Some of the smaller appliances, such as irons, have passed their postwar peak production but continue to run above prewar levels.

Production in electric blankets, electric dishwashers, waste disposers, home freezers and electric clothes dryers is booming.

Refrigerators, which barely regained their 1941 output level in 1947, are expected to hit a new record of 4 million units this year.

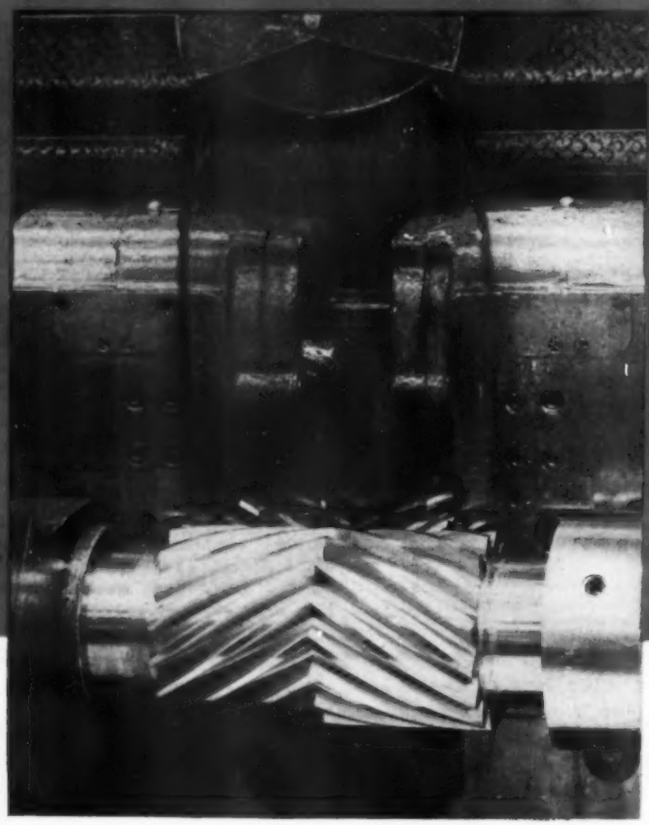
The gain in volume of appliances is partly due to the number of new manufacturers. Commerce Department survey shows that a count of all makes of about two dozen electrical appliances in 1947 would have totalled 981 items against 680 items in 1941. Of 1947's 981 items, 539 were produced by companies not manufacturing the item before the war.

Non-Ferrous Markets Strong

Recent developments in a strong non-ferrous metal market included: the announcement that the price of molybdenum would be advanced around 18%; a rise of 1¼ cents an ounce troy on silver and a slight lift on quick-silver. The increase in the cost of molybdenum is likely to affect the cost of steels used in the automotive industry.

Manganese consumption now exceeds that for 1947, and, based on the first half of 1948, is at an annual rate of 1.5 million tons. Demand for copper continues fairly active and sales by producers of October shipment metal now total more than 105,000 tons. Britain finally lifted its quotations on copper, lead, zinc and aluminum to conform with those now prevailing in world markets.

you can do better machining



...because Texaco cutting coolants assure faster work, fewer tool grinds, fewer rejects

Texaco Cleartex and Transultex Cutting Oils are transparent . . . permit machine operators to watch the cutting tool through the oil film — an important factor in faster work.

To machine better, faster, at lower cost, use the *right* cutting fluid *right*. That means, use Texaco. For Texaco has the proper cutting coolants . . . and the practical Lubrication Engineering Service . . . to assure you best results on every job.

Texaco Cutting, Grinding and Soluble Oils lubricate effectively . . . keep tool and work cool . . . prevent chip welding or wheel loading. Thus, you can machine faster . . . get more cuts per tool grind . . . turn out a greater amount of work with far fewer rejects.

Increase your machining efficiency and economy. Let a Texaco Lubrication Engineer — a specialist in machining operations — help you select and properly use the cutting fluids best suited for your purposes.

Call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Send for this 48-page, illustrated book: "Lubricants and Coolants for Cutting and Grinding." It describes the complete line of Texaco cutting fluids, contains much practical, cost-saving data on handling and using them for all types of machining.

TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

Tune in . . . TEXACO STAR THEATRE every Wednesday night starring Milton Berle. See newspaper for time and station.

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

"Automation" May Help You

Automation is a new word with which you should become familiar. It sounds impressive, as though it had been coined by the government people who devised such terms as "directives."

But the fact is that it originated far from the Potomac on the banks of a much smaller river, the Rouge. Ford has had an automation department since April of last year.

The automation department is the first of its kind anywhere. Its task is to design and put to work the mechanical devices which speed up the movement of work pieces into and out of production equipment, which turn parts over between operations, and which remove scrap.

The truth is that the human hand cannot keep up with the machine any longer. Presses, for example, are able to go through their cycle faster than operators can fit in place the sheet metal and take out the resultant stampings.

In these days of high wage rates and of manpower shortages, the only solution is to provide mechanical hands to do the work formerly done by human hands. That is especially the case if the desired output should run into high figures.

Ford has been up against a labor problem. It also has been faced with high costs, as has every manufacturer. What is more natural than that it should turn to something new, and create the automation department?

On the basis of Ford's experience with devices already installed, the results of the automation department's work promise to be spectacular.

Designs have been produced for more than 500 devices costing $3,000,000. And it is estimated that production will be increased at least 20%. Some 1000 men will be available for transfer to jobs where they are badly needed. Meanwhile operation of equipment is made safer.

Ford stresses that no one will lose his job because of automation, so far as one can see ahead. On the contrary, employees will be upgraded in many cases to control operator or maintenance worker on automation equipment, or shifted to other duties.

We are so excited about this new departure in manufacturing practice that we dispatched one of our most trusted editors to Dearborn to spend ten days getting us the story. His report to you begins on page 107 of this issue.

You may say, "Oh, fine stuff for Henry Ford. He makes a million cars a year. I'm just a little fellow. It doesn't apply to me."

Our comment is, "Don't be too sure. These are days when a lot of new things are being done. How do you know without close examination that what Ford finds so valuable at Rouge may not be adaptable to your smaller-size operation?"

We have Ford's word for it that benefits from automation may be more important on smaller work than on the mass-production jobs. If Ford feels that way about it, we suggest that you examine the matter carefully.

Perhaps Ford has pioneered in a new field which deserves your exploration too.

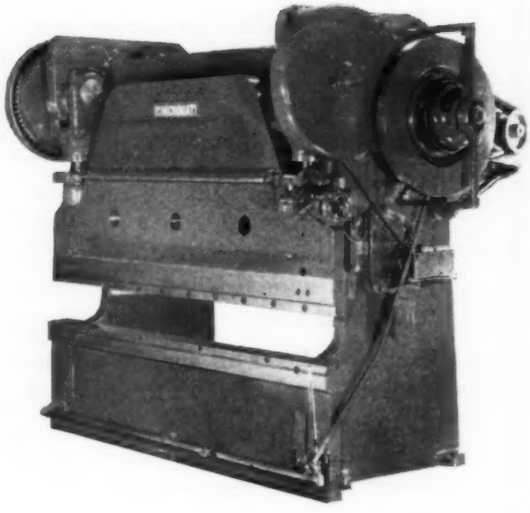
Burnham Finney

EDITOR

★ These dies are adjustable for various width drawers.

FINISHED

...IN *One* STROKE!



These wide dies, supported by removable angles, form six bends in these file cabinet drawers—finishing a drawer at each stroke of the ram.

It is production at low cost and illustrates the simple conversion of a Cincinnati Press Brake into a press. Remove the angles, and the machine is ready to function as a normal press brake.

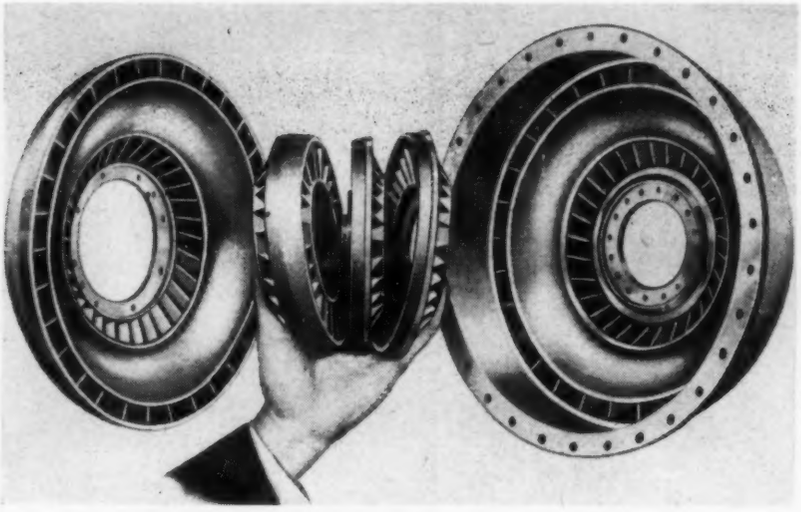
The speed and accuracy in production, and the diversified functions of Cincinnati Press Brakes, keep them busy—make them profitable.

Write for Catalog B-2, illustrating many applications and uses of Cincinnati Press Brakes.

THE CINCINNATI SHAPER CO.

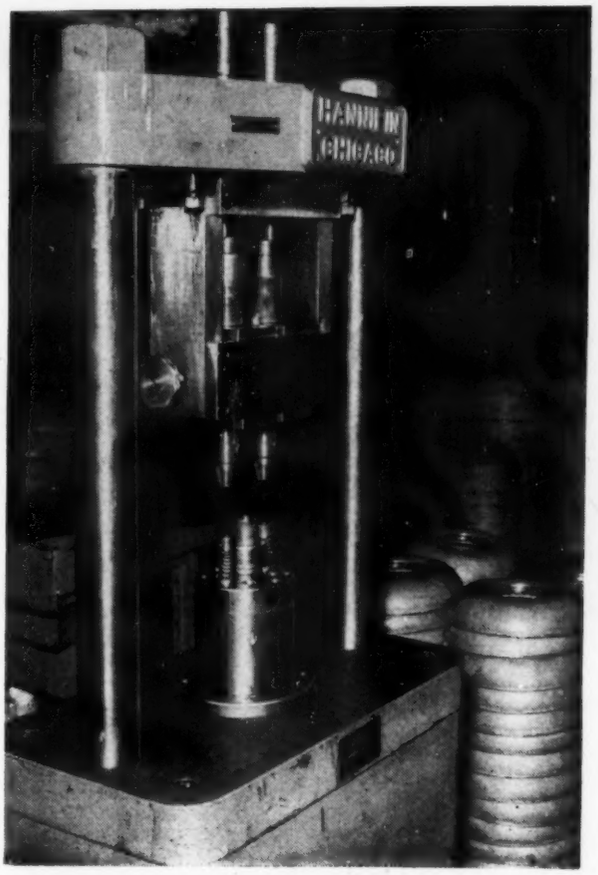
CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES



Torque converter unit consists of a pump unit (right), connected to the engine crankshaft; a turbine (left), connected to the rear wheels; and supercharger units (center), which produce a torque-boosting action in starting and accelerating. These are equipped with a roller type over-running clutch to prevent counter-rotation

HOW BUICK BUILDS THE DYNAFLOW



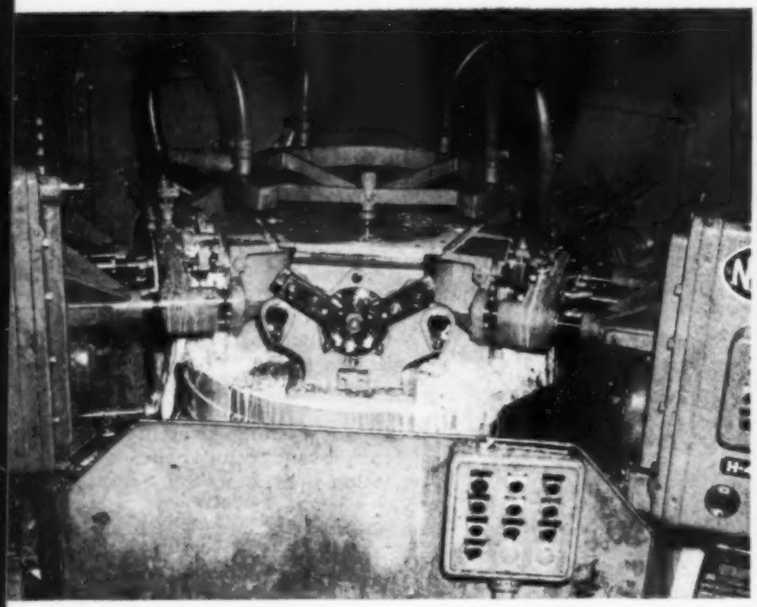
Aluminum rivets attach the steel hub to the primary pump. Hub is centered by a pilot and rivet sets are spring-loaded to clamp parts tightly before heads are formed. Riveting pressure is accurately controlled so rivets will not expand sufficiently to set up undesirable stresses in the aluminum flange

Special equipment and ingenious combinations of operations are employed to reduce manufacturing costs of a highly complex mechanism

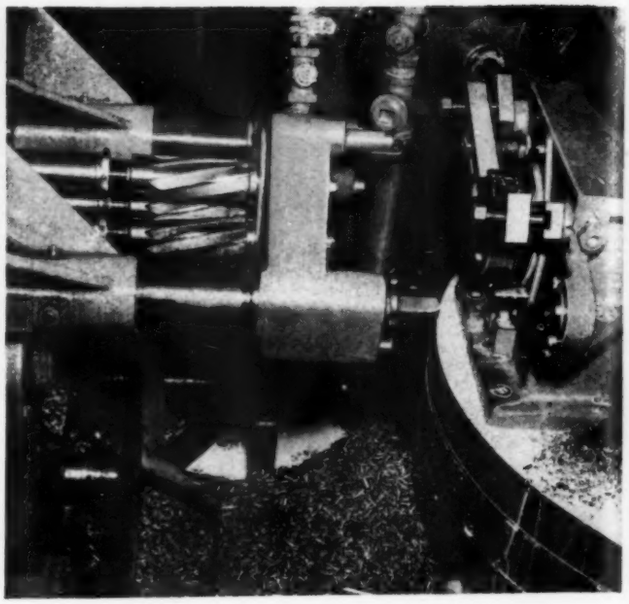
BY CHESTER RICKER
DETROIT EDITOR

MANUFACTURING methods adopted in producing Buick's Dynaflow drive at the Buick Motor Div., Flint, Mich., offered engineers unusual opportunities for developing new tools and techniques, as they were uninhibited by previous experience and existing equipment. Materials, methods, heat-treatment, dimensional tolerances allowable, and assembly methods all had to be pioneered from scratch. Furthermore, production was concentrated in an entirely new building, where most advantageous arrangement of machines and straight-line machining could be obtained.

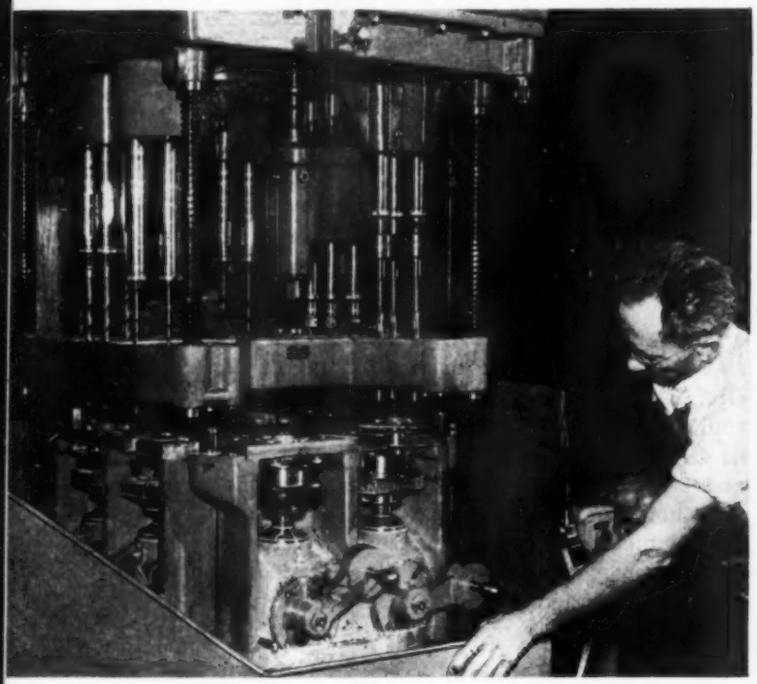
Automatic cycling machines with indexing tables are found on many jobs. Conveyors, however, are used to only a limited extent, a chain type with mobile assembly fixtures being used on the assembly merry-go-round, and roller types between machines in the cast-iron machining department. Cadmium-plated, special, wire tote boxes, A-frame racks, and compartmented wooden boxes are the principal methods of handling stock. This is due in some measure to the fact that Buick considers its present potential production capacity of about 400 units a day as hardly more than a pilot line. There is additional floor space in the new plant for greatly expanding this schedule as materials and machines



Special five-station Natco, equipped with rotary fixture, rough and finish end mills three planetary gear chambers and drills six holes in the gear carrier. Material is SAE 5140 steel forging with Rockwell C 25-32 hardness



Reverse spirals on end mill pilots prevent chips from entering the guide bushings and disturbing the accuracy of the spacing. Guide fixture is carried close to work and is piloted in workholding fixture for maximum rigidity



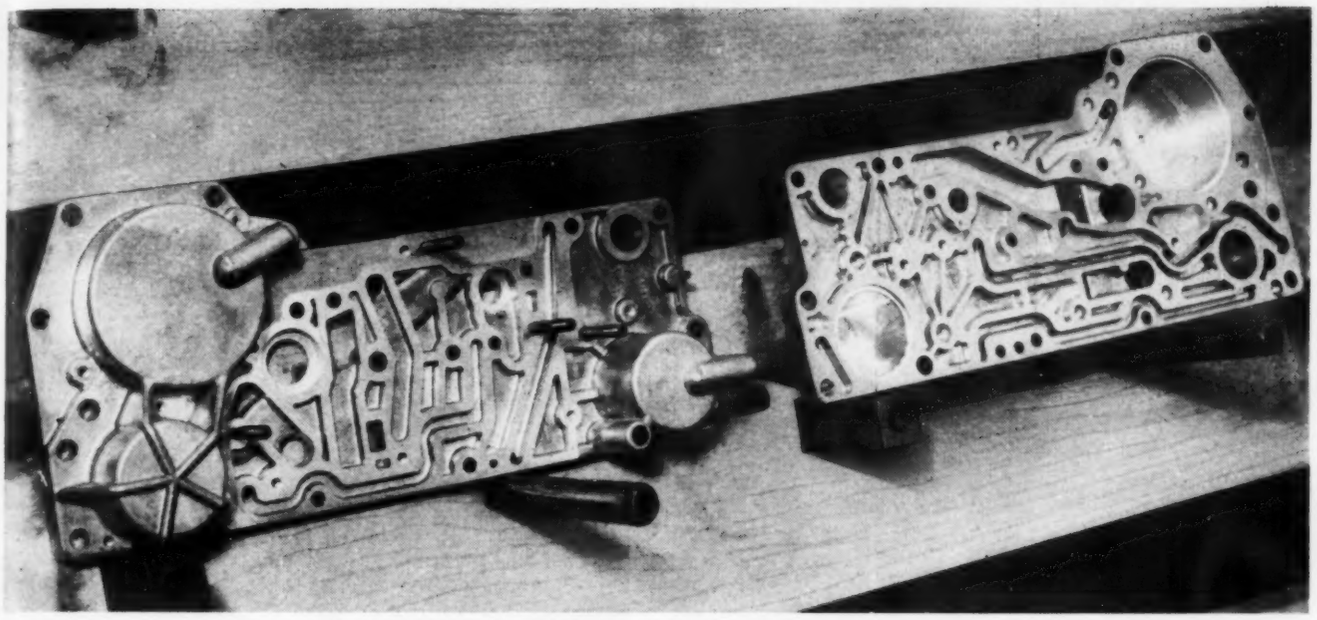
Four-station Natco drills, reams and taps three holes in planetary gear cover with part positioned in right-hand side of fixture. Part is then inverted in left-hand side and three holes rough and finish drilled, and reamed to 0.001-in. tolerance. Complete part is thus produced at each revolution of the fixture

Selective induction hardening of over-running clutch rings is performed on a Budd electronic heater. Eight roller slots are hardenend two at a time and machine is fully automatic for heating, quenching and indexing. Lubrication of fixture is insured by use of Dow-Corning silicone lubricant to resist heat and water

become available in the future.

Cast iron, high-tensile alloy steel-backed bronze bushings and precision plaster-molded aluminum rotor castings are a few of the materials in this mechanism.

In the cast-iron section, Newton continuous milling machines are employed for finishing the bottom and ends of the transmission case at one pass. In many cases, Ex-Cell-O precision boring units are provided to qualify parts. On one part, the planetary gear carrier, the holes for the pinion carrier shafts are held to a tolerance of 0.0005 in., and the spacing of six pinion shaft holes to 0.0004 in. Mi-



Bolt and screw holes are cast in the aluminum die casting for the servo-unit in which the practice of using oil channels is also followed. This permits complete inspection of all oil passages. Low- and reverse-speed brake cylinders are machined directly in this part

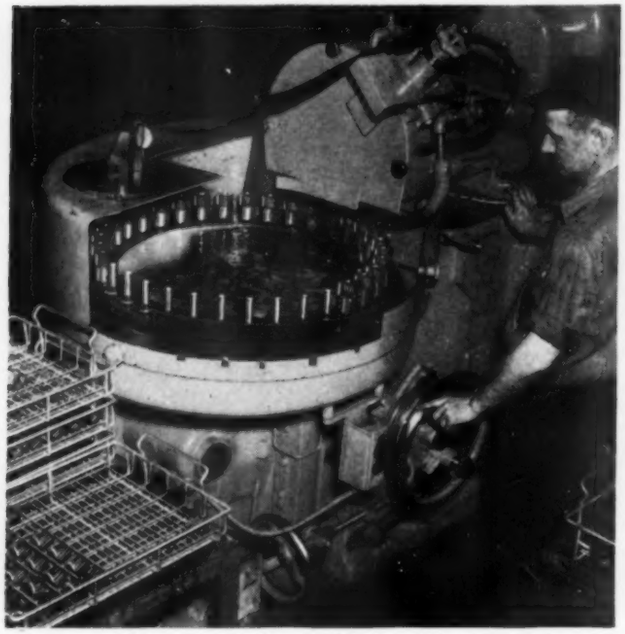
Low and reverse planetary pinions are bored in a New Britain Cam-pneumatic. Part is loaded into front diaphragm chuck for roughing, removing 0.003 in. of stock; then transferred to rear chuck for finishing, removing 0.00025 in. of stock. Both heads operate simultaneously

Pinion blanks are honed on a double-spindle Micromatic Hydrohoner with a Microsize automatic size control to hold the I.D. within a 0.00005-in. tolerance and to insure absolute straightness of the hole before cutting the teeth. Both spindles do the same kind of job simultaneously

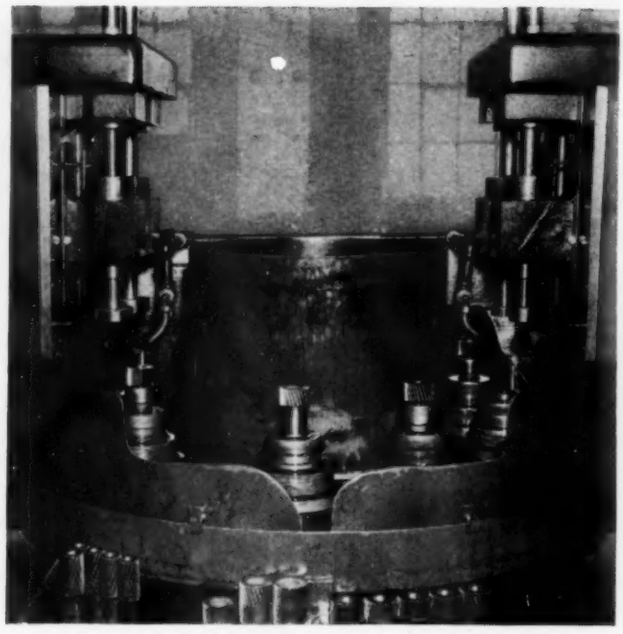
cromatic precision sizing hones the finish bores of gears both before and after heat-treating and many gears are lapped on the ends.

In the transmission, some extremely intricate porting is required for valves and oil passages, and the method adopted is to cast the oil passages as open channels in an aluminum die casting, then close them with an aluminum cover plate. This allows complete visual inspection but requires an accurately lapped surface on both parts to produce an oil-tight seal.

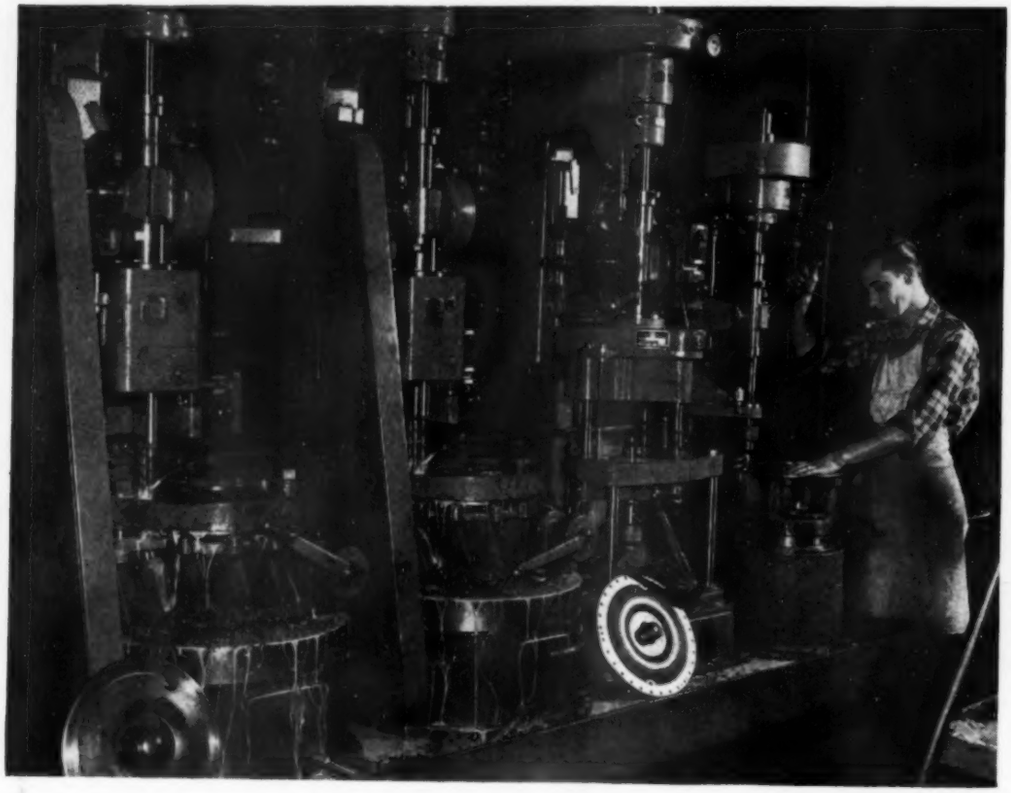
Two definite manufacturing policies are in force: The use of carbide tools wherever possible, and



Cut, shaved and heat-treated pinions are ground to length on a Heald 25-A machine. Fixture is arranged to handle both long and short styles. Cadmium-plated, compartmented, wire baskets are designed to prevent possibility of corrosion



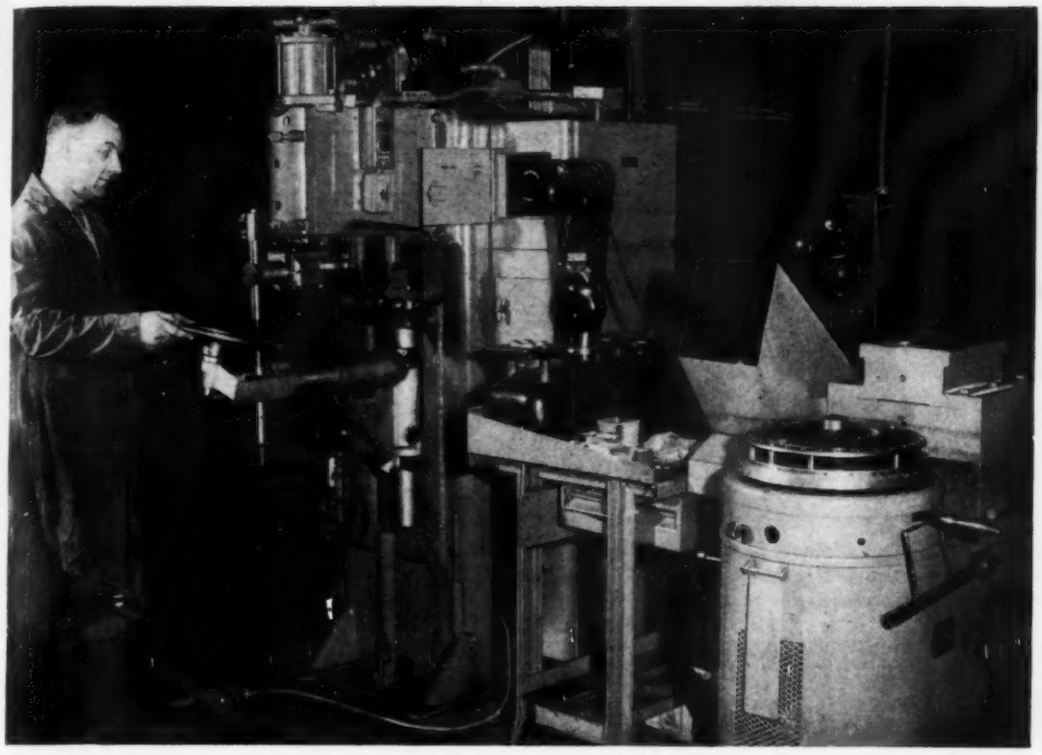
Special honing machine built by Hoern & Dilts is employed to finish the thrust faces of gears to 6 microinches. Two gears are rough and finish honed at a time, and spindles are adjustable to accommodate either long or short pinions



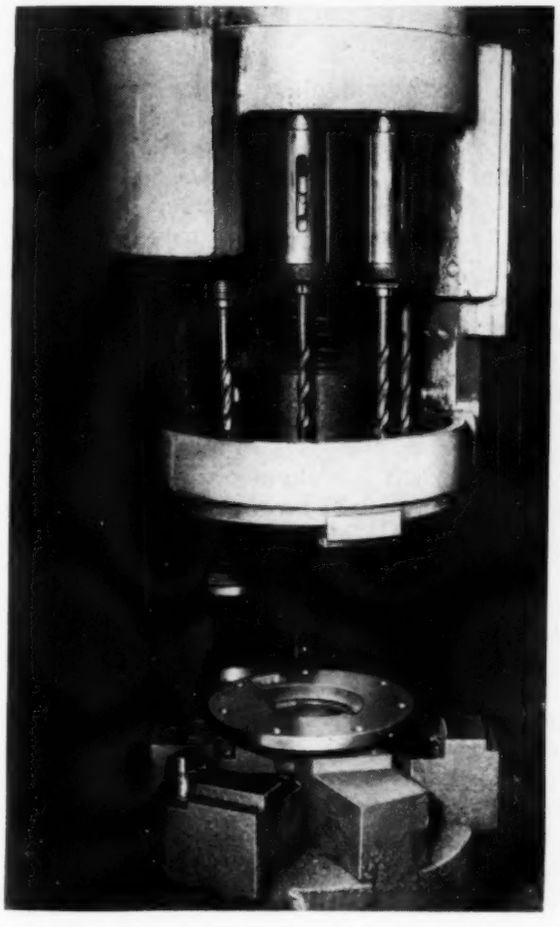
One man handles a battery of four Allen drillpresses for rough and finish drilling 30 holes in torque converter cover, drilling 3 dowel holes and tapping 5 flywheel attachment holes. Rotary drill fixtures index automatically for every three holes

the employment of diaphragm chucks for both quick loading and precision centering of work. Many machines are equipped with Sheffield air gages for 100% checking. Another policy, at the present time, is 100% inspection between all major and qualifying operations.

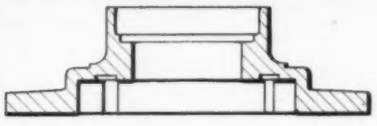
The Dynaflow drive consists of three major units; the torque converter, which includes five rotating members; the transmission, which includes a hydraulically operated multiple-disk clutch for direct drive and planetary gears to provide low-low and reverse speeds for maneuvering when parking; and a hydraulic control system. Details of some of the outstanding manufacturing operations are shown in the illustrations.

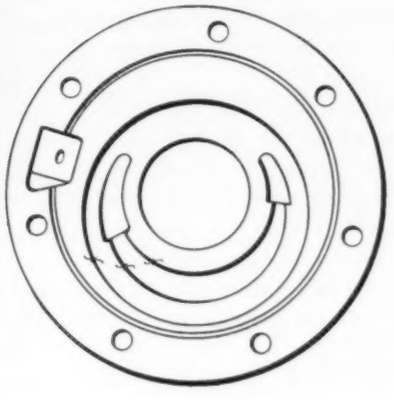


Torque-converter covers are dynamically balanced on a G.E. machine which indicates amount and location of unbalance. Small steel balance pieces of known weights are spotwelded to the inside of the cover, as needed, to obtain the correct balance



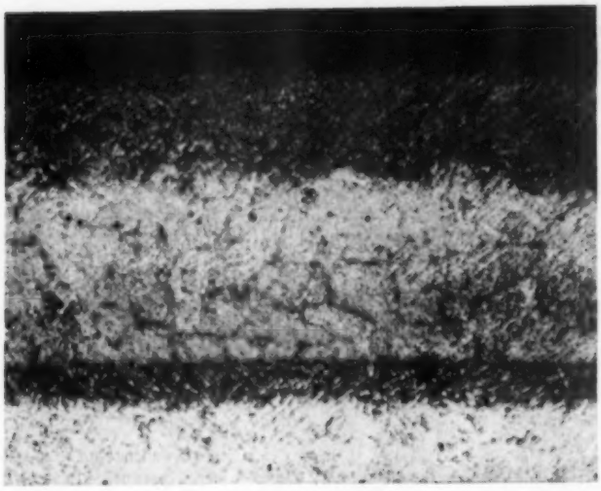
Special, seven-spindle drill head mounted at one station on a Bullard Mult-Au-Matic latches to the chuck in the down position, rotating with it during the drilling operation. Concentricity with other machined surfaces is thus insured without a secondary operation



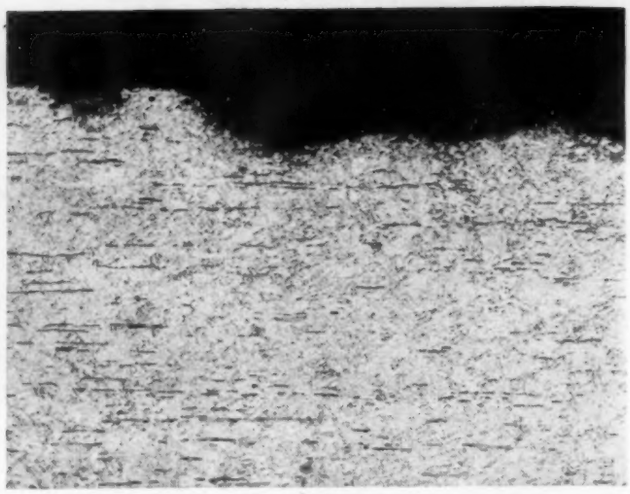


Special fixture for Bullard is designed to run ahead of the chuck until the spring latch engages a pin on the chuck, whereupon both parts turn together and an off-center cutter feeds down and bores the eccentric gear-chamber grooves in the pump body

Eccentric gear chambers in pump body present an awkward problem of production machining. Tolerance is only 0.0005 in. on the diameters. Operation is performed on a Bullard Mult-Au-Matic with a special fixture



Type 410 steel, precision cast and sandblasted, given standard nitriding treatment. Note penetration and uniform nature of case. 250 X



Type 416 steel, annealed, machined and then nitrided. Note the shallow and discontinuous nature of the case. 100 X

ROUGHEN STAINLESS BEFORE NITRIDING

Ordinary nitriding equipment can be used for martensitic stainless steels, if surface is roughened by sandblasting, pickling or bright hardening

BY S. DEDOMENICO, Metallurgical Engineer,
Materials Engineering Department
WESTINGHOUSE ELECTRIC CORPORATION

SURFACE condition is the primary cause of inconsistent nitriding of AISI 410 and 416 hardenable stainless steels. A matte finish gives an adequate and uniform nitrided case; a machined or ground surface will not.

This conclusion was reached after an investigation prompted by development of reliable nitrided cases on precision cast parts. Wrought or machined material of like analysis, on the other hand, either did not develop a hardened skin, or it was discontinuous and shallow.

The explanation generally accepted for difficulty in nitriding the austenitic stainless steels was this: A protective chromium oxide coating inhibited formation of nitrides by reaction of nascent nitrogen with the chromium in the steel.

But this hypothesis did not apply to the martensitic stainless steels (precision castings) because of the opportunity to form a passive chromium oxide coating before nitriding.

Actually, the precision-cast parts differed from unsuccessfully nitrided machined parts in two particulars: (1) they were hardened when nitrided and (2) they had a sandblasted instead of a machined or ground surface. Tests were first made to determine whether lack of hardening was responsible for inability to nitride the wrought and machined materials. Test material in three categories was prepared.

1. Samples were procured of Types 410 and 416 stainless steel in the wrought condition and Type 410 as precision cast. The samples of wrought material were hardened 15 min. at 1010 C. in an Ammogas atmosphere, followed by cooling in the same atmosphere. After this treatment, the wrought samples were bright but slightly roughened, as is typical of these chromium-bearing steels.

2. Other samples of wrought material were annealed and machined. On several of these samples and the heat-treated specimens, one face was ground to remove 0.001 in.

3. Precision-cast samples were annealed at 750 C. for 10 min. and water quenched to inhibit scale while cooling. A short pickle in hydrochloric acid removed the slight tarnish.

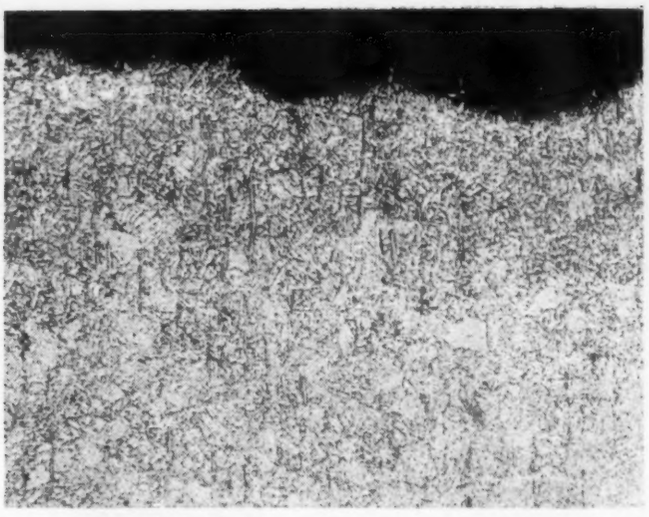
All samples in the three categories were given the standard nitriding treatment of 25 hr. at 530 to 575 C., as employed in production of Nitralloy parts. The results were:

All precision castings had a hard case on all surfaces.

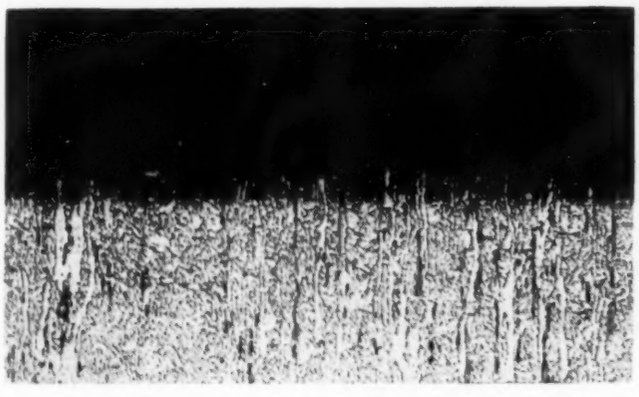
Hardened wrought steel parts also had a hardened case, but only on surfaces that had not been ground after heat-treatment.

Unhardened wrought steel samples displayed no consistent hardening effect.

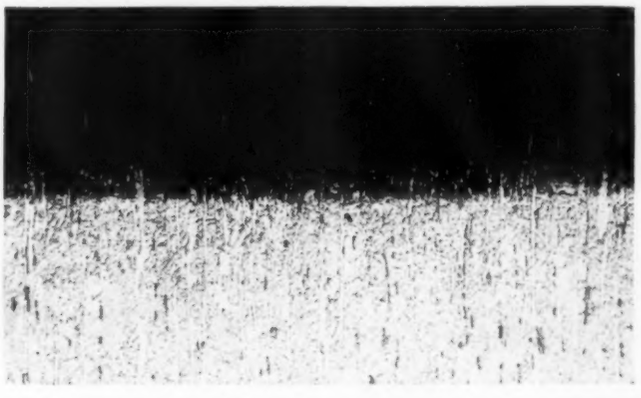
Type 416 steel, Ammogas hardened, nitrided. Uniform case is produced. 100 X



Type 416 steel, Ammogas hardened, surface ground and nitrided. The discontinuous nature of the case is typical of ground surfaces on this material after nitriding. 100 X



Type 416 steel, annealed, sandblasted, nitrided. Case is uniform in nature and depth. 100 X



Type 416 steel, annealed and pickled, then nitrided. Case is consistent in penetration and uniformity. 100 X

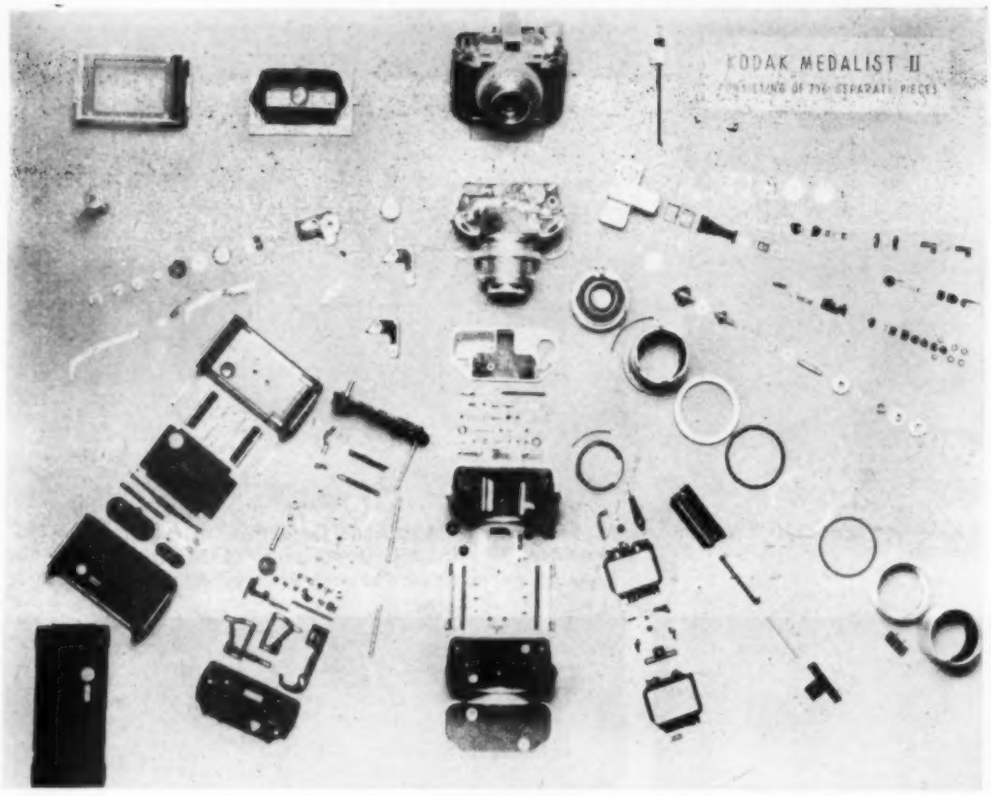
A second set of tests was run with specimens prepared with sandblasted, pickled, machined and ground surfaces. For these tests, the annealed wrought material was used. Also included were precision-cast parts with one face ground to remove the matte finish. It was expected that this test would establish the roles of heat-treatment and surface condition on the efficiency of nitriding the stainless steels.

Examination after nitriding revealed a uniform case on every surface with a matte finish as produced by sandblasting, pickling or heat-treatment in a bright hardening furnace with an Ammogas atmosphere. But samples characterized by machined or ground surfaces displayed no appreciable nitriding effect, regardless of previous heat-treatments.

Thus, it is clear that development of an adequate and uniform nitrided surface on Types 410 and 416 stainless steel is assured in ordinary nitriding equipment, if the surface of the steel is in a roughened condition as obtained by sandblasting, pickling or heat-treating in an Ammogas atmosphere.

Relationship of Heat-Treatment and Surface Condition to Nitrided Case Depth and Hardness

MATERIAL	CONDITION	HARDNESS (R15N)	CASE
Type 416 or 410	Annealed, machined or ground surfaces	75–78	Irregular and shallow 0.005" max. 15% no case
Type 410	Precision cast, 40-43 Rc, sandblasted surface	91–94	0.010 average
Type 410	Annealed, 15-17 Rc, sandblasted surface	92–94	
Type 410	Precision cast, 40-43 Rc, ground surface	75–79	
Type 416	Ammogas hardened, 40-44 RC, matte surface	87–93	0.012 max. 0.011 ave.
Type 416	Ammogas hardened, ground surface	74–80	Irregular and shallow, 0.0045 max., 25% no case
Type 416	Annealed, sandblasted surface	93–95	0.010 max. 0.009 ave.
Type 416	Annealed, pickled surface	93–95	0.009 max. 0.008 ave.



Nearly 800 separate pieces are required in the assembly of a modern, precision - built miniature camera, and more than 2700 special tools must be designed and made before full-scale production can get underway

CREATING A KODAK

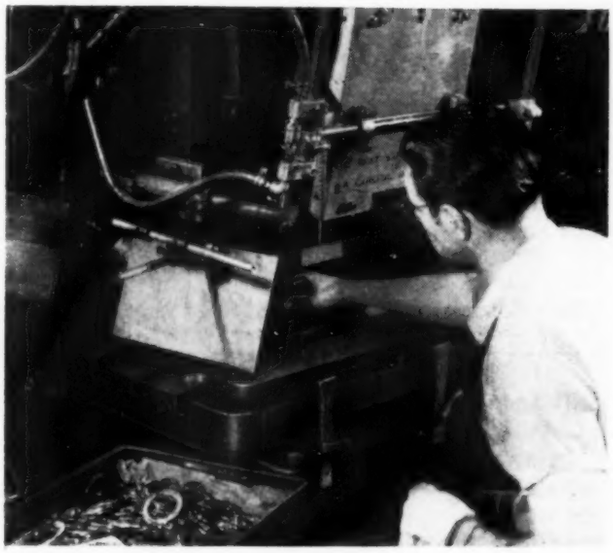
Standard and special equipment is combined at Eastman Kodak to manufacture a precision product on a quantity production basis

BY H. E. LINSLEY, ASSOCIATE EDITOR

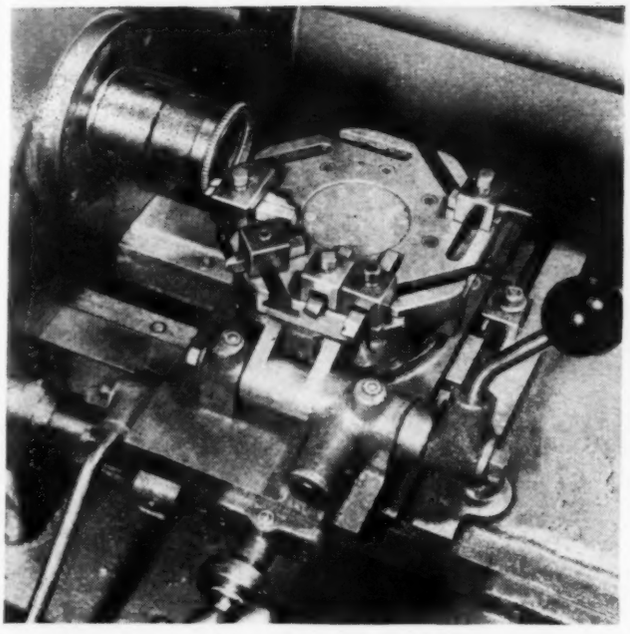
EARLY cameras were little more than a wooden box and a simple lens, and, provided all conditions were ideal, it was possible to take surprisingly good pictures with them. Modern photography, however, demands an instrument that will get the picture under any conditions and which will be always ready for instant use.

Typical of today's cameras is the Kodak Medalist, a piece of precision equipment consisting of 796 individual pieces and into whose manufacture must be combined the techniques of mass production and the skill of the instrument maker.

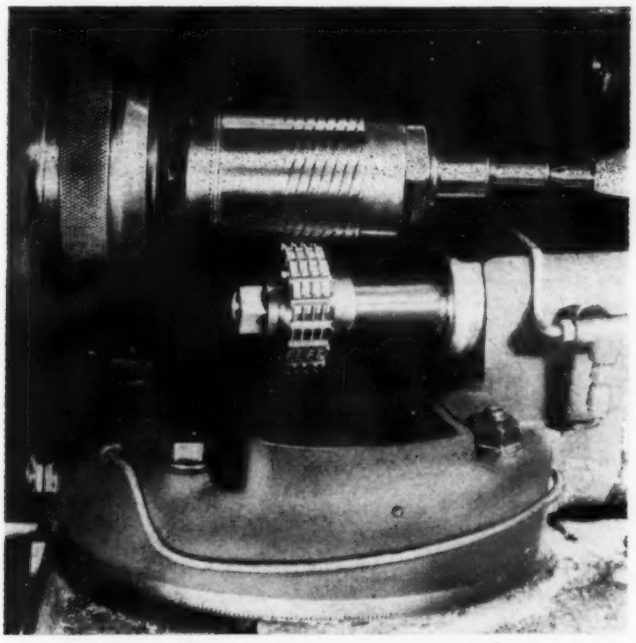
Front and rear halves of the case, and the top and bottom plates, are die castings. Other components are chiefly stampings or screw-machine products. Conventional progressive subassembly and assembly practices are employed, with the watch-like shutter assembly handled in a pressurized, dustproof room. Complete mechanical and electronic gaging equipment checks all operations of the shutter be-



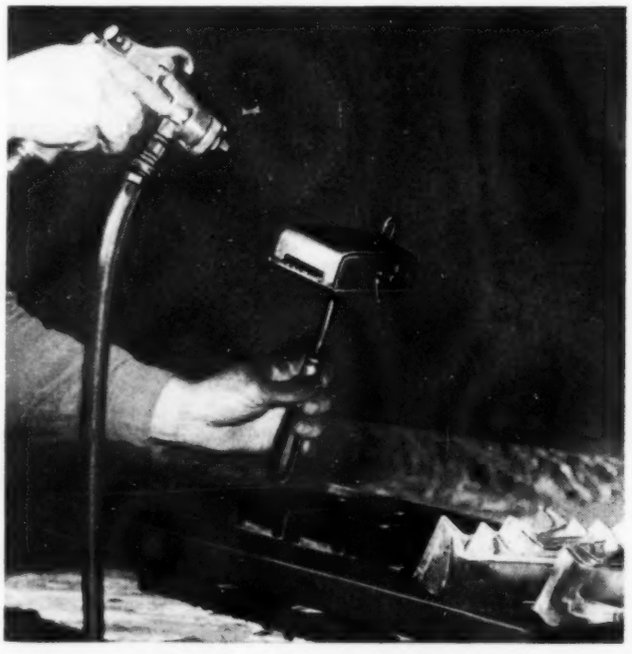
Punch presses play an important part in producing many camera components. Spring steel parts of very thin stock, as used in shutters, are blanked from hard stock by specially constructed dies and are virtually free of burrs



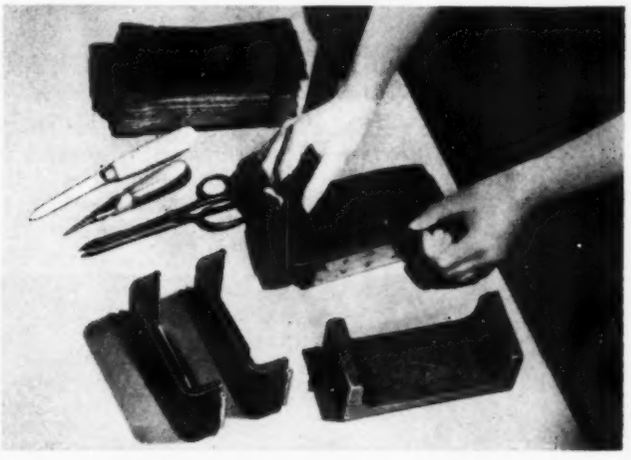
Special optical lathes, similar to automatic screw machines, produce high-precision parts such as the shutter-setting ring. Other parts are manufactured on standard machines and other production equipment



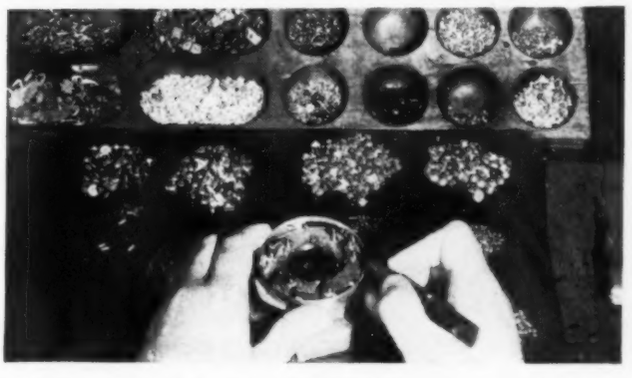
Standard gear hobber is modified to produce the special helical grooves on the lens mount which are too steep to be cut on a thread-cutting machine, but not steep enough for conventional gear hobbing



Special lacquer containing granular pumice is sprayed on surfaces to be leather covered to provide a bond for the adhesive. Holding fixture also acts as a mask to shield areas not to be covered with leather



Die-cut leather panels are cemented to the case with a special adhesive applied by spray gun. Trimming is done by hand and the part is placed in an electrically heated mold to cure the cement

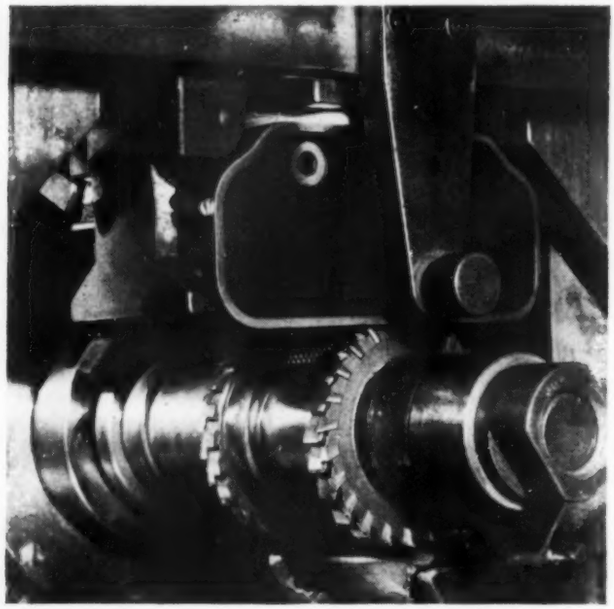


Timing and synchronizer gear trains are assembled in a dust-free room after the diaphragm and shutter blades are in place. Technique is similar to watchmaking and demands a high degree of skill

fore this is shipped to the optical plant for installation of the lens system.

Tolerances on most parts are held within 0.0002 in., and all burrs must be eliminated to insure smooth, frictionless operation. No lubrication is permitted on any of the operating mechanism as this would cause variations in the speed of the shutter action at the different temperatures at which it might

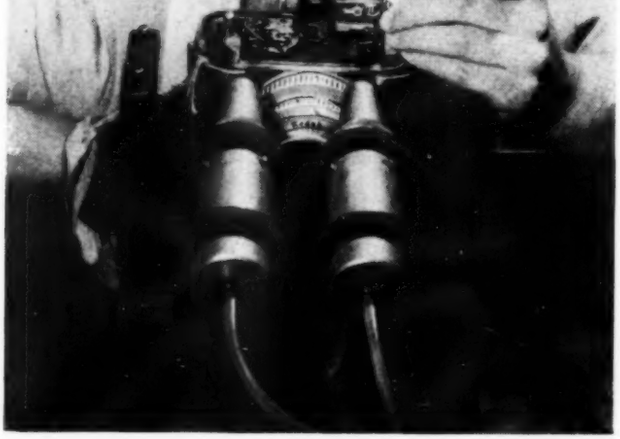
be used. Lightness is highly important from the point of view of the user, but the entire unit must be strong enough to withstand constant handling and to stand up to considerable abuse in service. It must present an attractive appearance, be virtually impossible to get out of adjustment. be simple and easy to operate, and is expected to last a lifetime. Some of the many hundreds of high-precision operations are shown in the accompanying illustrations and concern the production of the camera itself. The work of producing the optically correct lens is performed in a separate plant.



Film rails are finish milled at assembly to maintain direct relationship with the lens tube opening. This location is highly critical and cannot be obtained economically by machining it independently of the assembly

Electronic gages designed by Kodak, measure in thousandths of a second the time interval between the electrical contact and the full open shutter position to check the accuracy of the flash synchronizer action

Optical test fixture checks the lens and shutter assembly to make sure that the sensitive adjustments of the two units have not been disturbed in transit between the optical plant and the camera works



Final adjustment of the range finder requires the use of precise optical jigs so each of the two separate telescope systems can be aligned and focused to produce a single picture in the finder

TALKING SHOP

S.O.S.

THESE CRYPTIC INITIALS stand not only for "Help", but also for the Army's Service of Supply. Rice Barton Corp., paper-equipment maker, has achieved both meanings with a little 5x7-in. card which was mailed recently with the company's house organ to customers. On the card are names, titles, and *home* telephone numbers of RB men who would be helpful in emergency. The card also carries regular office phone numbers, night number and branch numbers. It is labeled "You May Need One of These in a Hurry Some Day", and is of a size to be tucked under the desk glass or tacked up beside the master maniac's phone in a customer's plant.

Tin Saver

FORD main and connecting-rod bearings will henceforth be a new design of steel-backed bushing to save tin and cost. A 0.0625-in. steel back is given a tightly bonded 0.02-in. coat of copper-lead bearing metal (about 75% Cu, 25% Pb) while in strip form. Strip is cut to length and die formed. Flanged bushings are not coated on bends, so the coat is unaffected by forming. Bushing blanks are precision-broached to high finish, then bearing surfaces are tin-plated to 0.001 or 0.0015 in. The plate is 89% Sn, 11% Pb and gives excellent wearing qualities, according to Cleveland Graphite Bushing Co., the maker.

Auto Sizing

AUTOMATIC SIZING on cylindrical grinders frequently is faster on short-run jobs than hand sizing nowadays, principally because automatic sizing units can be set up in a few minutes and maintain tolerances within a couple of tenths. Coupled with automatic wheel dressing—even of contoured wheels—automatic sizing again makes the machine quicker than the hand.

Thirsty Jobs

GETTING COOLANT to the work at the point of contact of the tool is an increasingly difficult and vital problem as production speeds go up and materials become harder. Landis Tool is, for example, experimenting extensively with the idea we mentioned a couple of years ago of feeding coolant through the grinding wheel itself. This procedure flushes the wheel clean and centrifugal force helps the flow. On friction circular saws, pressures as high as 500 psi. are used to make sure the coolant isn't deflected by the air envelope surrounding the high-speed saw. Quenching the thirst of the cutting tool extends tool life, improves finish and guards against burning . . . Paradoxically, current research indicates that *faster* machining means *better* machining.

Europe was startled at the Olympia show by the speeds—and resulting production—of American gear hobbers and grinders, had to test to be convinced that tolerances, finishes and product were improved as a result.

Daffynitions

WIFE: a continual buzzing in the ear. . . . SMALL FIRE: one extinguished before the fire department does any damage . . . POLITICIAN: man with a wordy cause . . . VACATION: swapping a 50-week "roll" for a 2-week loaf . . . HOLLYWOOD MARRIAGE: the short tune between "I do" and "adieu" . . . TREE: a thing that will stand in one place for years, then jump in front of a lady driver . . . VACATION: 2 weeks that are 2 short, making you 2 tired 2 return 2 work, and 2 broke not 2 . . . CANDY BAR: a small lump hiding in a large economy-size wrapper . . . SOUND: stuff that's slower than a jet plane . . . MONEY: something that still talks, but seems to have less cents . . . MODERN GIRL: one who sticks by the spinning wheel—until her chips give out . . . RACE TRACK: a place with windows that clean people.

Field Sprinkler

IN THE Willamette Valley of Oregon, rainfall is sufficient to insure good crops—about 52 in. average a year. But there is practically no rain in July and August, so the chance for three, instead of two, crops a year was lost. Enterprising farmers began as a result to use supplementary irrigation—in effect sprinkling the fields just as you would sprinkle the lawn. (This has been done for many years in a small way on so-called "truck" farms, with hand labor, but such permanent installations are not practical on mechanized farms, both because of their size and because of interference with machines.)

Present equipment includes portable sprinklers capable of delivering 40 to 800 gpm. over radii of 40 to 150 ft.—or as much as two acres. These are supplied by aluminum-alloy pipe in one-man sections 40 ft. long. Each pipe section incorporates a quick-acting snap-fit coupling with rubber gasket.

The idea began about five years ago, but has spread East rapidly only in the last year or two. Now, even Long Island potatoes are being irrigated that way—wherever a stream or suitable well is near by. The pumping equipment is frequently second-hand truck engines coupled to "scrap" centrifugal pumps from mining or construction operations, mounted on trailers so it too can be moved about as needed. That's one reason for tightness in the old engine and pump market.

This is just another—and rather unusual—indication of the mushrooming agricultural market for the products of Metalworking. Farm mechanization proceeds apace.

CARBIDES SPEED COPPER MACHINING

Changes in drill and threading-tool design

cut cycle time and produce better finishes with reduced tool breakage

BY C. R. MORGAN, Screw Machine Section
GENERAL ELECTRIC CO., PITTSFIELD, MASS.

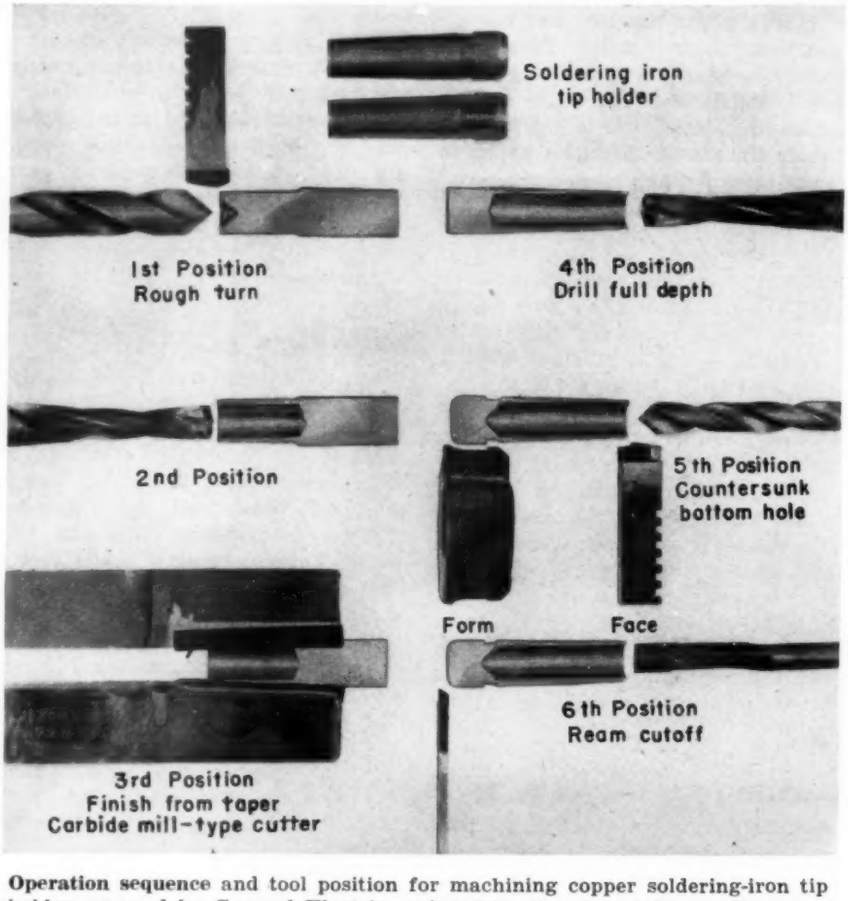
COPPER is one of the materials giving most trouble in screw-machine processing. Much heat is generated in machining copper, and this results in wear and breakage of tools. Carbides apparently are one answer, but conventional grinds cannot be used for top results. Therefore, we have entirely changed the design and practice of grinding, particularly of drilling and threading tools.

Dead Center Eliminated

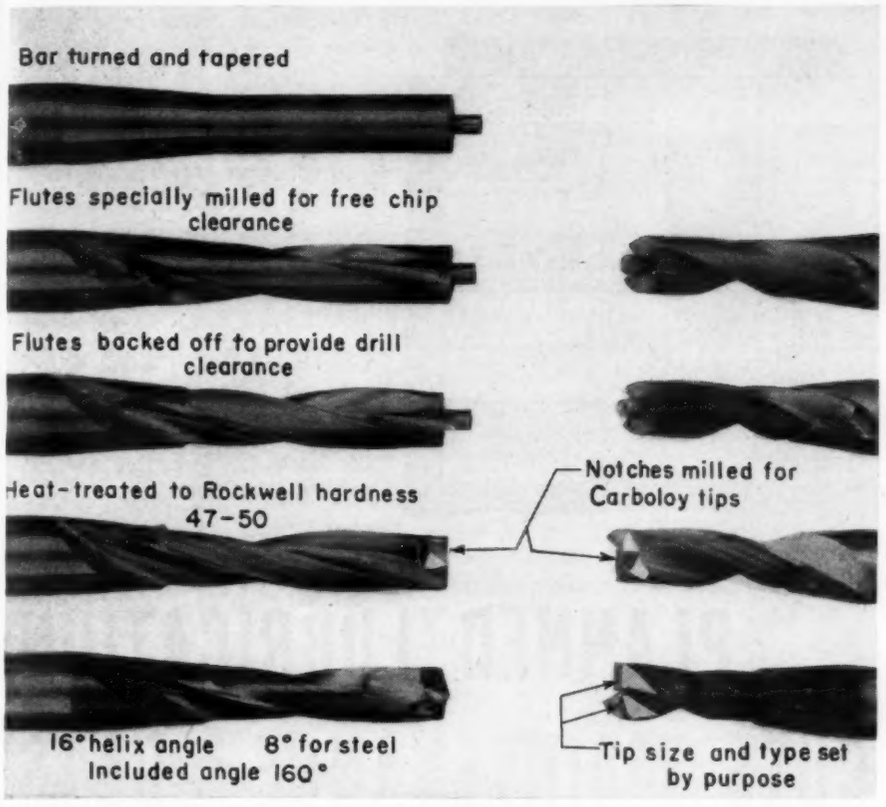
Conventional tools were not too great a handicap on turret lathes and hand screw machines. Here only one or two tools were in operation at the same time. The greatest trouble came with several types of tools working in unison on multiple-spindle automatics. Here the drilling and threading presented the greatest drawback to holding cycle time to a minimum. Therefore a design for cemented-carbide inserted tips in twist drills was devised whereby the dead center or non-cutting web was eliminated. This resulted in a free-cutting tool with every portion of the cutting lip actually removing material. By this step we have accomplished: (1) great reduction of heat; (2) elimination of undue pressure at center of drill with free-cutting action; (3) removal of more material with a lower power demand at the same speed, or increased speed with the same power. This also permits increasing speed and power without tool breakage.

On chasers and taps, we now grind lead threads undersize but to perfect form. This results in a free-cutting tool with each lead thread doing a finishing cut on the preceding one. We thus thread faster (in fact at the same speeds as other materials) generating little or no heat on tool or material and obtaining finish almost comparable to that of ground or rolled threads.

Two parts have been run on a production basis over a period of months, with several thousand pieces of each manufactured. They



Operation sequence and tool position for machining copper soldering-iron tip holder, as used by General Electric, reduced heating to minimum, thus producing accurately formed parts with excellent finishes. Method also shortens cycle time


Bar turned and tapered
Flutes specially milled for free chip clearance
Flutes backed off to provide drill clearance
Heat-treated to Rockwell hardness 47–50
Notches milled for Carboloy tips
16° helix angle 8° for steel
Included angle 160°
Tip size and type set by purpose

Copper drill with Carboloy cemented-carbide inserted tips, used by General Electric, eliminates non-cutting web. As every portion of the cutting lip actually removes material, heat is cut to a minimum. At the same time, the drill eliminates use of a spotting tool or center drill and finish is comparable to reaming. Production stages of the drill are shown above

typify our methods. One part is made from ¾-in. dia. copper rod 2¾ in. long. It has a formed taper 2 in. long, major diameter 0.725 in., minor diameter 0.600 in.; and drilled 2 in. deep with a 0.520-in. dia. drill running 2000 rpm. (270 fpm. cutting speed) with a feed of 0.007 in. per revolution. Smooth finish on both drilled hole and formed taper were produced satisfactorily without subsequent operations. Cycle time was 14 sec. Tool life on drills was approximately 1500 pieces between grinds; about 5000 pieces were taper-turned without grinding tools.

Other copper parts are produced in approximately the same cycle time. The stock removal is made from 1¼-in. dia. copper, knurled, drilled 1 in. deep with a 1⅛-12 tap-size drill, and tapped. This is also made on a 6-spindle automatic. The tool life has been increased more than 70% with better finish and closer tolerances. The drill is cutting at about 300 sfpm., holding to less than 0.001 in. of drill diameter and producing better finishes than were previously accomplished by a reaming. Results have proved that reaming will be almost abolished and threading can be held closer with a minimum adjustment of the dieheads.

Spot Drill Eliminated

Another advantage of the changed method of drill grinding is to eliminate the need for a spot drill. This type of drill will allow starting from the most uneven surfaces without deflection or breakage. This also is true of threading tools. Commercial water-soluble solutions are used for coolants and provide sufficient lubrication and cooling properties. The free-cutting feature of these tools with this type of coolant result in lack of heat which in turn eliminates the problem of distorted parts. Therefore, parts are dropped off in the natural condition and close tolerances are more easily held.

Carbide-tipped drills and chasers are now being produced in limited quantities and can be purchased from small-tool manufacturers.

Safer Ways of Using Die Sets

BY W. R. JEFFRIES
Instructor, Mech. Engr.,
Montana State College

WITH SMALL DIE sets it is sometimes advisable to use punch holders which have no shanks. In a plant where I spent considerable time supervising die design, we found that setup men often were relying on a setscrew against the shank to hold the punch holder firmly in place. After a few accidents caused by shifting or dropping of the punch holder, we removed the shanks from many of our sets, especially pierce, or pierce and blank dies. This forced setup men to bolt the punch holders securely in place.

We felt that the shank was needed for form dies where end or side thrust was not neutralized. In some cases this forced us to use larger die sets to allow for mounting holes for screws in the punch holder, but the time saved and injuries avoided seemed to justify the move.

On limited production where large sheets or formed parts are held by hand and located on pilot pins for piercing and/or blanking, it is advisable to "invert" the die. Place the blanking punch on the die shoe and the die on the punch holder. This permits much easier location of the part on the stationary, up-pointed pilot pin and also reduces temptation of the operator to place a hand in the open die to aid location. Slug and blank disposal problems sometimes arise, but they can usually be solved by using the knockout bar and a blast of air. Air cushions often help.

PARTS TO BE LUBRICATED	LUBRICANT	METHOD OF APPLICATION	NO. OF POINTS	FREQUENCY	CHANGE PERIOD	RES. CAP.	AVERAGE MONTHLY USAGE

Lubrication record cards eliminate all haphazard oiling and give a complete story for each machine. Space is provided on the back for recording the results of laboratory tests

PLANNED LUBRICATION CUTS MAINTENANCE COSTS

Machine tool breakdowns traceable to faulty or inadequate lubrication can be avoided by following a properly organized service program

BY CHARLES H. PARKS
Assistant Works Manager
THE BULLARD CO.

CONTINUOUS, long-term, trouble-free operation of modern machine tools can be achieved only if proper attention is paid to lubrication. And to insure that every machine in a plant receives appropriate service it is highly desirable to establish and maintain a lubrication control plan. A modern shop may contain a hundred or more different types of machines, each of which requires attention at a score or more of points, and no two of which may be exactly alike.

One of the first requisites is proper organization. The old idea of giving every worker an oilcan and letting him oil his own machine is gone. Instead, some one person must be made responsible, and that person must be endowed with sufficient authority to see that his instructions are carried out.

At the Bullard Co., this responsibility for actual lubrication has been placed with the head of the repair department. This department, being responsible for the repair of all breakdowns, is in a position to see and analyze those which are caused by faulty or inadequate lubrication. It is in a position to correct this condition and install the proper type of lubrication, having the necessary tools and equipment available; and finally, being familiar with all types of machines, its members soon pick up a fund of valuable information on the subject.

Under the repair department head is the chief oiler who actually supervises the work of the oilers. He is thoroughly familiar with the entire plant, and it is his duty to see that the plant is fully covered. He is responsible for taking samples of oil from the machines for delivery to the laboratory, for supervising oil changes, and for reporting conditions to the repair department head.

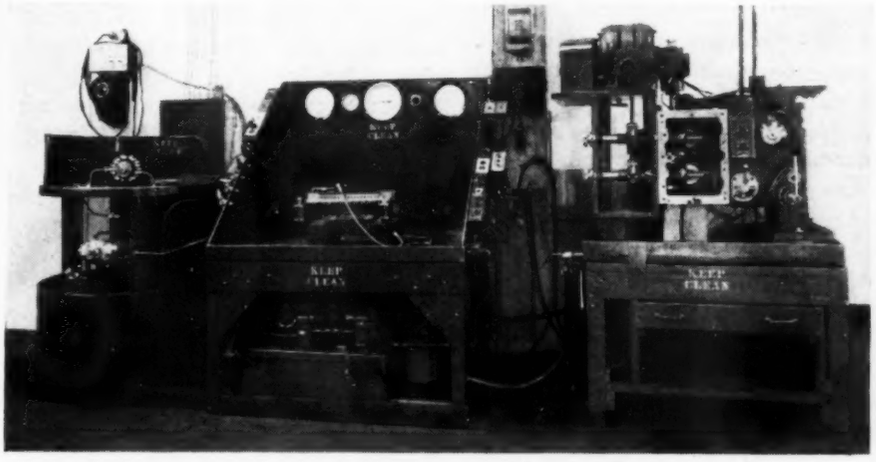
The next step is to decide what lubricants should be used. The machine builder usually makes certain specific recommendations, but too close adherence to these may result in stocking a wide variety of lubricants, an item which the average shop cannot afford to do, and which, moreover, leads to confusion. It is better, therefore, to standardize on a few items and purchase these to specification. For its own use Bullard has prepared a set of data sheets in which each lubricant is given a code number. Alongside each number are listed typical machines for which that particular material is to be used, and the specification to which it is purchased. For example, under the heading of Spindle Oils three oils are listed as S-30, S-60, and S-100. The first is suitable for use on Norton, Brown & Sharpe, and Mattison grinders and is to be used for spindle lubrication where kerosene and oil mixtures are specified. The second is suitable for Ex-Cell-O, Norton and Landis spindles operating at over 5000 rpm., and the third is for use on Brown & Sharpe, Cincinnati, Heald, and Pratt & Whitney spindles operating at 1000-5000 rpm., where the manu-

facturer specifies a 100-150 SSU oil. For convenience, the code letter S stands for spindle, and the code number is the approximate viscosity number.

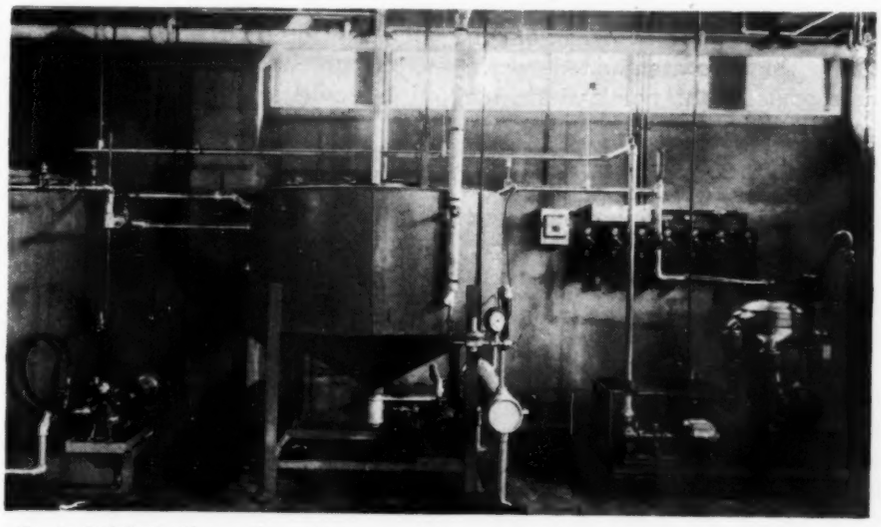
With these standards established, Bullard then set up lubrication records and charts and instituted a card index system in which was recorded the lubrication requirements for each machine and a record of the dates on which lubrication service was performed. The system provided a means of bringing up a record card at the right time for the next service.

When the system was first installed, lubrication charts were attached to each machine to instruct the oiler as to exactly what lubricants should be used and where they should be applied. This, however, was discontinued after some months, as the oilers had become sufficiently familiar with the routine to make such charts unnecessary on the machines, but a copy is kept on file for reference purposes in case of any dispute.

This system has proved entirely satisfactory for maintenance of production and general equipment and has materially reduced the amount of wear and number of breakdowns. As a machine tool builder, Bullard is also faced with the problem of lubricating new machines on the production line. Assembled mechanical and hydraulic units, as well as the finished machine, must be run-off and tested. This requires the handling of large quantities of lubricating oil, and here the emphasis is on cleanliness and convenience. All machine oil used is of the hydraulic type and contains a rust inhibitor additive.



Hydraulic test stand for Man-Au-Trol control unit. Each stand is connected to the central supply system to insure the use of absolutely clean oil. In addition to checking the proper functioning, the test also flushes out any dirt or contamination that may remain in the unit after manual cleaning



Central lubricating oil system consists of a 3000 gal. storage tank (left), a return tank with Taco heater unit (center), and a centrifuge (right). All oil used on subassemblies and erected machines passes through this system to insure a constant supply of absolutely clean oil for test purposes

Test Procedure

The procedure is as follows: Assembled mechanical units are cleaned and washed as thoroughly as possible to remove all chips, dirt, sand, lint, etc. The unit is then placed on the test stand and filled with oil from the clean oil line of the central system. After test, the oil is returned to the used oil tank in the plant basement.

With hydraulic units, even greater care is taken to insure cleanliness, and units are washed out under high pressure until they are as clean as it is possible to get them. They are then connected to a test tank for operational tests. The oil in this tank is circulated during the test, clean oil coming in from the central system and used oil returning to the basement tank for clarification.

A similar procedure is followed on the erecting floor. Originally, the machine reservoir was filled with oil and this was used for the duration of the test. Now, however, the tank is connected into a circulating system so there is a constant supply of clean oil and the problem of recirculating dirty oil through the machine is completely eliminated.

Although every possible precaution is taken to keep machines clean, a certain amount of dirt is picked up during the running tests. This dirty oil passes into a large dirty oil tank and cannot get back into the central system without passing through a Taco heater and a centrifuge. The centrifuge discharges into the central clean oil tank from which the oil is pumped to the feed lines.

The dirty oil tank has a capacity of 3000 gal. to take care of the fluctuation in the number of machines on the floor, as there is always the possibility of several large machines being emptied at nearly the same time and all this oil being suddenly dumped into the tank. A

repeating float switch on the erecting floor shows the foreman how much oil is in the tank at all times.

From time to time new oil is added, as there is considerable drag out. Indeed, it is estimated that from five to six gal. of oil are shipped out with each machine.

Rust Preventive Needed

Fresh rust preventive is also added as this is plated out; the amount being determined by laboratory tests. It has been found that rust inhibiting additives are important as they serve to protect parts from rusting when exposed to the atmosphere in the plant and during shipping, and also protect against moisture from condensation or other causes.

A third phase of the lubrication problem with which the machine tool builder has to contend relates to lubrication of the machine after it has been installed in the customer's plant. Theoretically, of course, he has no responsibility in this regard, but to insure continued customer satisfaction he has actually a very particular interest.

To this end, Bullard engineers have prepared lubrication instruction sheets, based on their own experience, which are available to customers. In these sheets they recommend careful and wise purchasing of the most suitable lubricating and hydraulic oils to specifications; cleanliness in installation and application of lubricants; and a simple but positive test at regular periods to determine the condition of the oil.

For Mult-Au-Matics, Cut Master and Man-Au-Trol vertical turret lathes, Contin-U-Matics, and 30-H lathes a high quality turbine type oil is suggested for all main reservoirs, bases and feed brackets. This should conform to the following specification:

Viscosity	140-160 SSU at 100 F.
Viscosity Index	100 approx.
Pour Point	20 F. max.
Flash Point	375 F. min.
Neutralization Number	0.10 max.
Additives	Rust inhibitors are to be incorporated by the lubricant manufacturer.

A high grade SAE 50 oil (viscosity range 80-105 sec. (Saybolt) at 210 F.) is recommended for rail raising brackets, rail turret heads rail ram heads, side heads, feed screws, ways and slides.

When installing the lubricant it is recommended that care and cleanliness be exercised at all times, and it is pointed out that the initial charging of a new machine will have much to do with its future successful operation. Dirt should be wiped away with lint-free rags, never with cotton waste, and any apparent condensation should be removed before charging with lubricant. Attention should also be paid to the cleanliness of drums, containers, transfer pumps and other oil-handling equipment.

Rancid Oil Dangerous

A new machine should have a complete change of oil after one month of operation. Thereafter, oil should be removed before it has deteriorated sufficiently to have formed sludges and acids, or increased in viscosity enough to endanger machine operation. An indication of oil oxidation is a rancid odor. Contributing to short oil life are high operating temperatures, moisture in the system, contamination from dirt, coolant, industrial and humid atmospheres, and churning and foaming.

The neutralization number is the index of acidity of an oil. It is obtained by following the procedure set forth in ASTM. Spec. D663 and D664. During the operation of a machine, organic acids are formed in the lubricating oils. When an oil has become contaminated with these acids to the point where its neutralization number equals or exceeds 0.5, oxidation can increase at a very rapid rate, resulting in attack on the machine members and causing their malfunction. Badly contaminated machines require very frequent oil changes to thoroughly clean their systems.

The use of the neutralization test, plus an examination of the difference in appearance and odor of new and used oil, will tell the user when to change oil. Complete tests should be made if a slight rancid odor is noticed at any time. Information on how to conduct these tests can be obtained from the American Society for Testing Materials. They are fairly easy to perform, and can be handled by the user if simple facilities are available, or by any commercial laboratory. Regardless of any other considerations, oil should be changed whenever the neutralization number reaches 0.5.

No definite period can be established for periodic oil changes, as conditions necessarily vary from machine to machine, and from plant to plant, but under average conditions a check every four months should be sufficient to establish a working basis. The final check period, however, must be determined by experience.

When making an oil change, it is not sufficient to merely drain and refill the reservoir. The filters should be cleaned, and the sumps carefully wiped out to remove any accumulated sludge and dirt.

In the case of small reservoirs, under 5 gal. capacity, containing heavy oil, it is usually cheaper to change the oil every six months as a routine procedure, than to make the tests to determine the condition.

Change Period Variable

Constant attention must be paid to all equipment to see that it is not operating under abnormal conditions which might tend to reduce the regular oil change period. For example, a machine which usually operates on one shift may require its oil changing every six months, but if it is switched to two shift operation, or used for a long run of exceptionally heavy work, the oil life will be materially shortened. Oilers should then be instructed to pay particular attention to this machine, and to take samples for laboratory test at more frequent intervals.

The recommendations given above refer only to the care of oil in reservoirs. Lubrication points equipped with Zerk fittings, drip oilers, or plain oil holes, should receive attention once each shift as a general rule. This is again a matter of experience, combined with the recommendations of the machine builder, and is one of the items that should be recorded on the lubrication record card.

FORD HANDLES BY Automation

AN "IRON HAND" pulls a wheelhouse stamping out of the draw die, increasing production 20% and permitting transfer of one man

BY RUPERT LE GRAND
ASSOCIATE EDITOR

Automation, the Ford Motor Company believes, will accelerate the production tempo, improve safety and make intelligent use of men to control machines instead of serving as beasts of burden

ESSENTIALLY, automation is the art of applying mechanical devices to manipulate workpieces into and out of equipment, turn parts over between operations, remove scrap, and to perform these tasks in timed sequence with the production equipment so that the line can be put wholly or partially under pushbutton control at strategic stations. Manual work is largely restricted to placement of small subsidiary parts in an assembly.

Primary purpose of automation is not to "save labor" in the usual sense. Ford has three problems: (1) to operate its equipment at maximum rate in order to achieve planned production goals, (2) to distribute the available labor supply over jobs that require human dexterity, and (3) to make jobs safer. Principal applications of automation are to date:

TO PRESSES: (1) sheet feeders, (2) extractors, turnovers, stackers and loaders for blanks, (3) unloaders, turn-overs and loaders for drawn stampings, (4) applicators for drawing compounds, (5) scrap removers, and (6) finished-part counters and baggers.

TO WELDERS—station-to-station transfer devices.

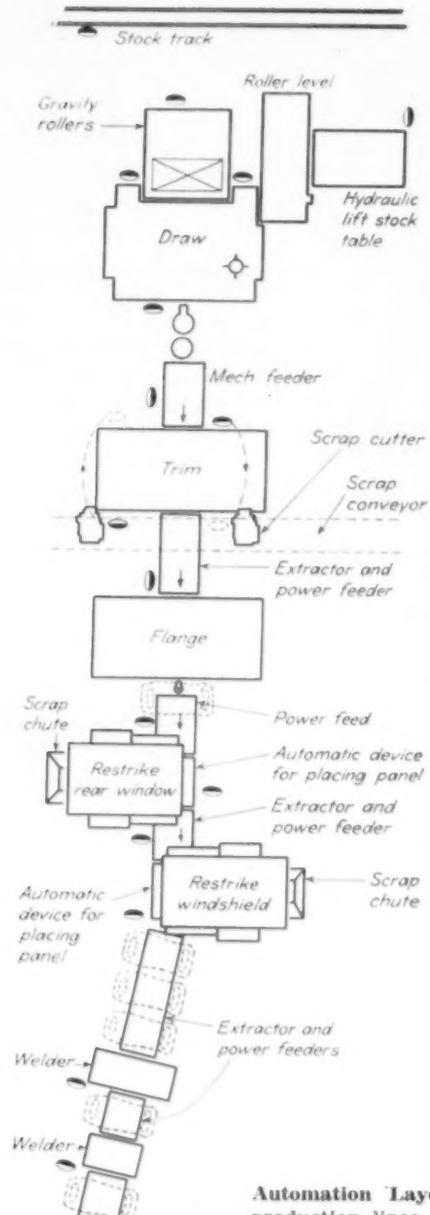
TO OTHER EQUIPMENT—loaders, unloaders and part-turning devices used in connection with quenching, drawing and shotblasting of coil springs and in machining of valve guides.

Since its inception in April 1947, the Automation Dept. has produced approved designs for over 500 devices to cost $3,000,000. From experience with devices already installed, it is expected that production will be increased 20% on the average, jobs will be made safer, and approximately 1000 men will be transferred. No one will lose his job in the foreseeable future because of automation; many people will be upgraded to control operator or maintenance worker on automation equipment.

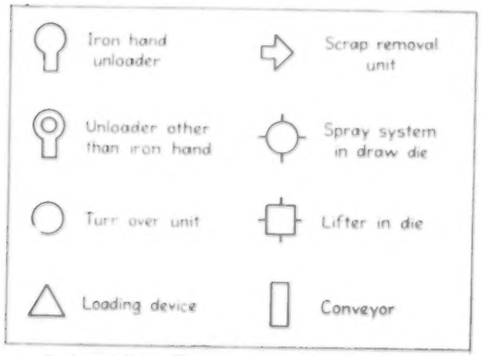
So far, the Automation Dept. has worked on larger workpieces, made on major production lines, but it anticipates that the advantages of automation on smaller work may prove even more important. A ten-year program at a high level of activity is thus foreseen, because most parts will be studied.

Copyright, 1948, by McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

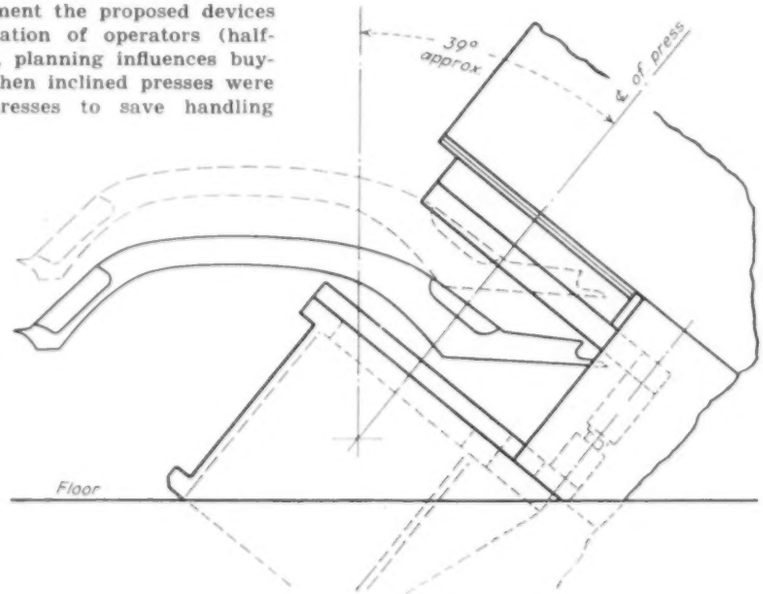
How Automation Is Specified



Automation Layout—Plant layout drawings for production lines are revised by automation engineers to show management the proposed devices (see symbols) and location of operators (half-shaded ellipses). Often, planning influences buying of equipment, as when inclined presses were substituted for gap presses to save handling (below)



Automation Devices are indicated on production layouts by these symbols



SINCE its inception, the Automation Department has functioned on the project basis. Its engineers seek out parts-production lines where it is obvious that only a few operators are needed to control the equipment, where the majority work at feeding and unloading, turning parts over and stacking them. Projects are screened for greatest potential with respect to increasing production of the line and operator transfers.

Selected projects are assigned to section leaders, each of whom is a specialist on press work, welding, heat-treating, machine shop work, etc. Four or five assistants to the section leader are skilled machine designers. The department contains approximately 50 people.

On-the-job surveys reveal situations where "automation tooling" and "automation equipment" appear justified with respect to either or both of these counts: (1) production will be increased and (2) probable cost of the device will not exceed $3000 per man transferred.

As mentioned, there are two classes of devices: Automation *tooling* must be amortized in one year because of obsolescence by model changes. Automation *equipment* will not be obsoleted by a model change and can be amortized over several years. But as a general rule, the $3000 limit per transferee is observed for automation *equipment*, because there are many golden opportunities to apply the automation concept at present.

Procedure for setting up a project on a formal basis is:

1. The section leader procures the "minute costs" to produce the part. Every part and every operation in the plant has been studied. Minute costs are on file.

2. An estimate is prepared of minute costs after installation of automation devices. If the savings over one year will amortize a particular automation device, its installation is considered justified.

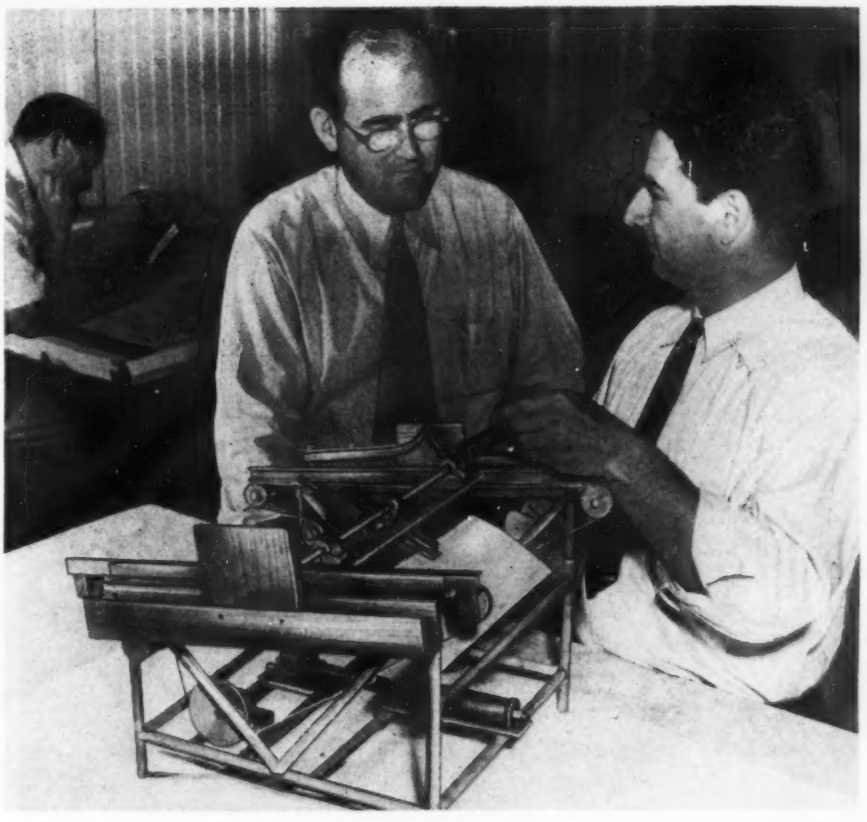
3. The project is listed on a schedule board in the Automation Department. Entries on the board give the project number, part name and part number, department where part is made. Spaces are included to show progress of automation design.

4. A schematic layout of the part-production line after automation is prepared. Basis for the

layout is the drawing originally produced by the Plant Layout Department. This drawing is altered to show location of proposed automation devices, using symbols. (See accompanying symbol chart.) Operators required after installation of automation devices are indicated by half-shaded ellipses.

5. A report to management is prepared. This consists of factual data on savings in minute costs and an estimate of automation cost, a copy of the schematic layout and a request for an appropriation. Management and production executives are thus able to visualize the efficiency of proposed installations and check costs.

6. A photostatic copy of the schematic layout is posted on a bulletin board. Presence of the appropriate automation symbol indicates that the device has been planned and its nature. When the device has been designed and ordered, an *X* is drawn in the symbol. After the equipment is installed, the symbol is shaded or colored. Thus, all persons having an interest in automation of a part-production line or of any portion thereof, can see at a glance the status of the project.



Models Help—G. G. Murie (right), supervisor, Automation Dept., explains operation of a combination unloader and turnover device to Joseph Murray, by means of scale model. About 20 models have been made to check operation of unusual devices and train maintenance workers in special school

Design of Equipment

Ford designers must take several matters into consideration when designing automation devices:

Equipment Spacing — One or more devices must be fitted into the available space between machines. In most cases, this has been achieved, although spacing of presses, for example, ranges from 6 to 15 ft.

Fast Operation—Elements of the automation device must operate rapidly to perform the desired function before the press closes. Air cylinders are commonly used to get fast operation.

Cycling—Motions of the automation device must be coordinated with the operation of the machine. Cams or cranks on the machine itself may control the automation device, but often limit switches perform this function. Additional limit switches within the automation device control its motions, prevent double feeding and pile-ups, and stop the machine itself if such conditions threaten.

Synchronization — Automation control panels at strategic situations on the line control machines and automation devices up to that point. All circuits are carefully interlocked.

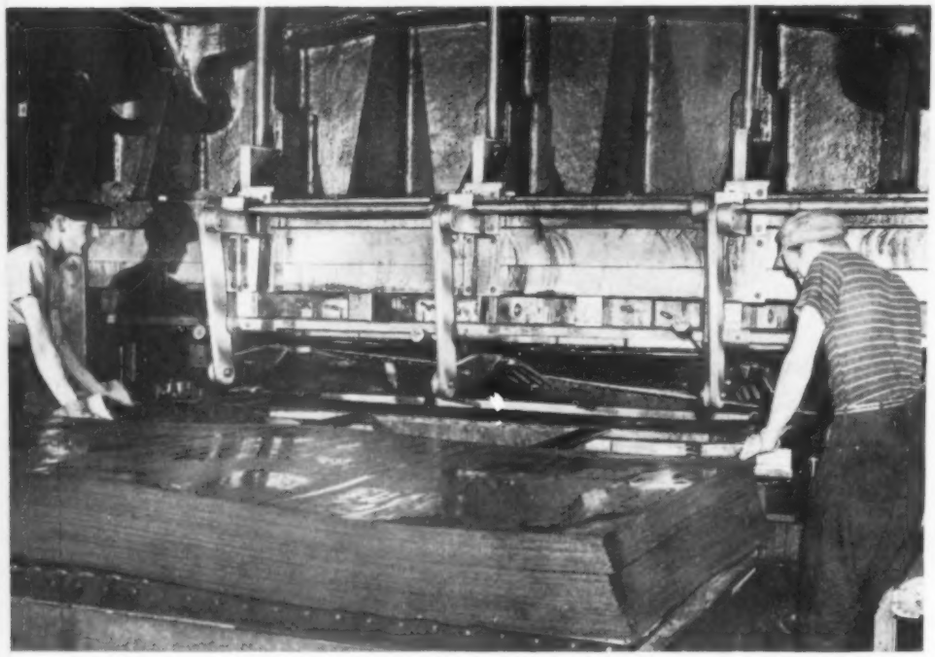
Ready Removal—All automation devices on the floor are fitted with casters for quick removal in case of die trouble.

Scrap disposal—Automation devices must not interfere with easy scrap removal.

Die and Press Design—The automation designer must work with the die designer so that the best over-all results are achieved. It has been found that more daylight than common is helpful to the automation designer; that the height of the bolster might well be increased to aid in scrap removal. Also, the recommendations of the automation designer affect purchase of equipment. For example, men were used to position the roof panel at an angle while a vertical press restruck the window reveals. Now, a conveyor carries the panel horizontally to inclined presses.

The following pages discuss the design of various kinds of automation devices and the economies expected. Some of these designs are not original with Ford. The "iron hands", for example (first described in *American Machinist*, page 112, Dec. 19, 1946), are built under free license of General Motors' basic patents. And some of the turn-over devices are similar to Fisher Body equipment also described in the above article. These two groups of automation devices were included in the report for these reasons: (1) Ford has introduced modifications and widened the scope of application, and (2) it was felt that a complete picture should be given of how extensively the automation concept is being applied to Ford operations.

Frame Rails Blanked and Formed Semi-Automatically



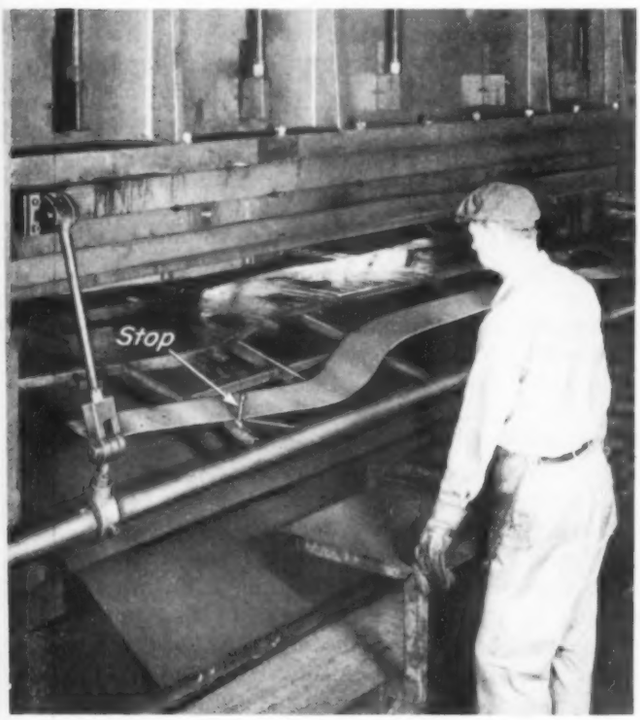
Paddles on hinged arms enter dies, catch frame side-rail blank when it is released by vacuum cups, and cause blank to slide onto turn-over device at rear of press. Hydraulic lift table keeps stack at die height

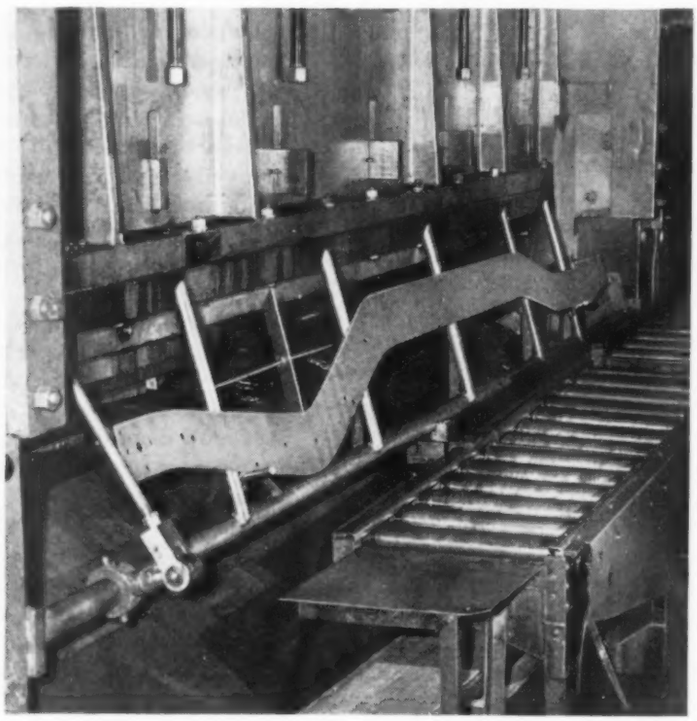
IT IS true that the automation concept can be applied with little difficulty to existing press lines, but the installation of an entirely new line provides an excellent opportunity for the machine designer to exercise his talents. Manufacture of side rails for the new Ford-built frame is a case in point.

Four parallel press lines blank and form the inner and outer rails for the right- and left-hand box sections of the frame. Many automation devices were planned in advance of installing the presses. Details of these devices will show how the labor of handling a long, heavy piece has been overcome.

The blanking and forming of the outer rail will serve as an example. Stock in the form of squared sheets 15 ft. long by 45 in. wide is dropped by a crane onto a hydraulic lift table surfaced with rollers. The table keeps the stack at die height so that the feeders need only shove the sheet into the die. Each sheet yields four blanks.

Problem in blanking is to separate the blank from the scrap automatically and to transport a long irregularly shaped piece to the forming press without fouling and





Turn-over device at rear of blanking press is operated by a linkage connected to press ram. Stops on the device, as seen at left, catch the blank and align it for carrying on the roller conveyor. Press-ram movement causes the blank to be turned over, as seen at right, and to fall upon conveyor. No operator will be needed after the automation device is found to function without mishaps in loading the conveyor properly

snagging. The piece need not be turned over for the forming press, but it is actually turned over twice to maintain alignment during transportation on roller conveyors.

To achieve the first turnover at the blanking press, two automation devices are employed. One is located at the front of the press, the other at the rear.

At the front, there are hinged arms (on a rocker shaft) terminating in paddles. The rocker shaft is operated by contact with vertical tierods fastened to the press crown. Thereupon, the hinged arms swing the paddles into the die in position to deflect the blank when it falls from vacuum-cup lifters. The lifters are automatically released at the proper point in upstroke of the ram. In falling, the blank hits the paddles and is caused to fall and slide onto the second automation device—a turn-over at the rear of the press.

To Maintain Alignment

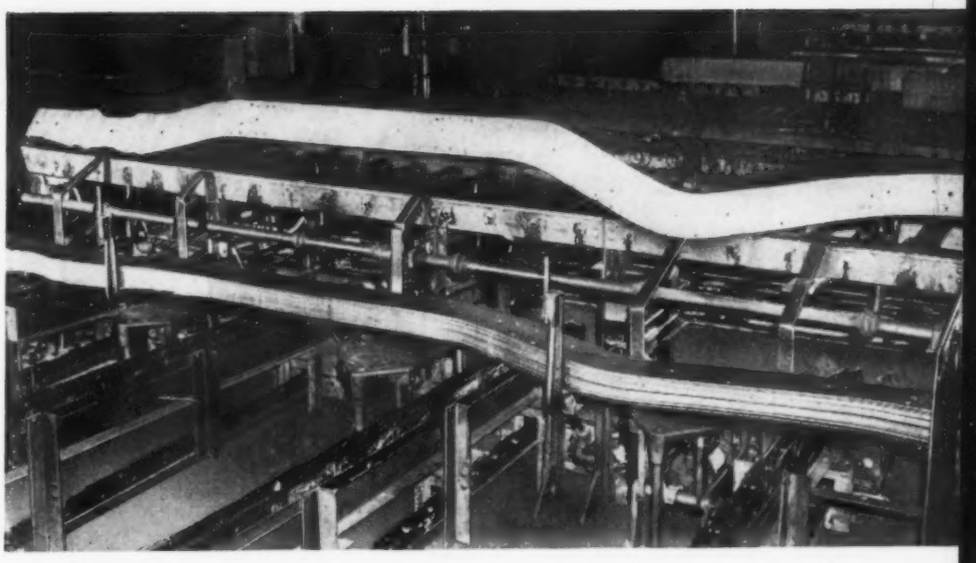
The turn-over is fitted with two stops that arrest the irregularly shaped blank in proper alignment for transportation by a roller conveyor, after the piece is turned over. At the next stroke, a linkage connected to the ram rocks the turn-over arms to the vertical position. The piece falls onto the roller conveyor in the turned-over position.

Scrap from the previous operation is pushed off the press bed by the edge of the advancing sheet, falls down an apron onto a belt conveyor running in a direction opposite to the roller conveyor. The scrap is taken to a cutter which dumps onto a belt conveyor. Finally, the scrap is conveyed outside the building and deposited in a gondola car.

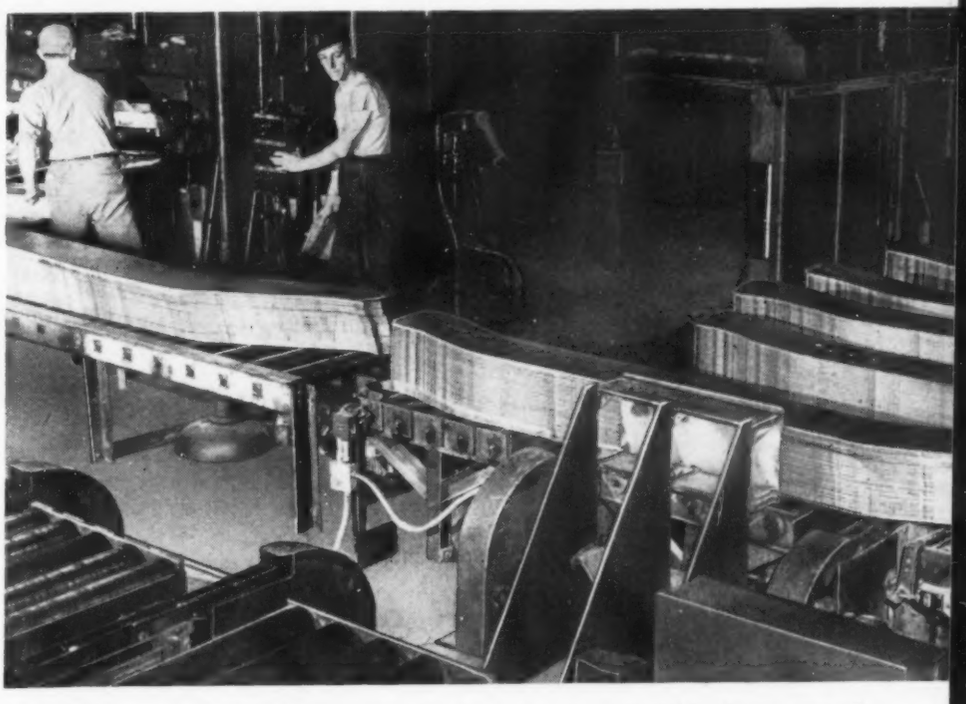
To return to the blank, which is moving along the take-away roller conveyor: Eventually, the piece hits a limit switch, and is lifted off the roller conveyor, turned over and stacked. Lifting arms operate between the rollers. Stacking arms and tables are positioned by hydraulic mechanism above crosswise chain conveyors, which serve a run-out table or storage area.

Operation of the run-out table and the supply of stacks to the forming press are under control of an automation operator stationed at the forming press. When he sees that a stack is of sufficient height, he operates push buttons to lower the stacking arms and tables, allowing the stack to rest on cross-rails and chain conveyors fitted with dogs. Then, by operating other buttons, the stack is inched out of the way so that the stacking mechanism can be restored to its operating position.

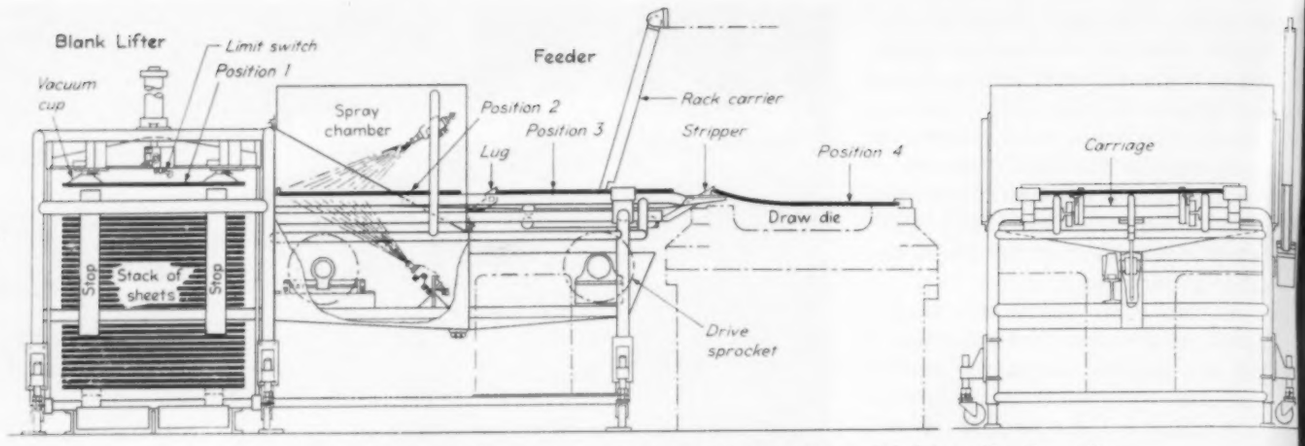
To supply a stack to the forming press, the automation operator manipulates controls for the run-out table until a stack is delivered to a power-driven roller conveyor. When the stack reaches the proper position in front of the forming press, it is pushed sidewise onto a hydraulic lift which saves much arduous handling of the piece.



Side-rail blank has tripped limit switch at end of first roller conveyor, causing turnover to operate. Piece is now right side up for use at forming press



Automation control operator moves stacks onto run-out table from second turn-over, feeds stacks onto power-driven roller conveyor leading to the forming press in background at left



Squared sheets are picked off a stack, oiled and fed into the draw die 20% faster than by hand. Three men can be utilized for other work

Sheet Feeder and Oiler

MANUAL feeding of blanks into drawing presses often requires several men. Blanks must be swabbed with drawing compound, picked off the stack and manhandled into the dies. All of these operations are tedious and disagreeable. Much drawing compound is wasted, either because hand application is not sufficiently selective with respect to areas needing the treatment, or because there are no means of heating viscous fluids.

The picking of blanks singly from a stack, oiling them and feeding them properly into a draw die can be made completely automatic, even in the case of big sheets. Labor can be used more effectively elsewhere, production increased and drawing compound saved.

Consider the arrangement installed to handle blanks for drawing the lower half of the fuel tank. Blanks are 30¼ in. square. To handle the blank manually, two men were required to pick up a sheet, pass it through a soap roller. A third man guided the sheet into place in the dies and tripped the press control.

With the automatic blank lifter, oiler and feeder, one man can control the draw press. In fact, even he will not be needed when it is seen that all automation devices up to the trim press are functioning continuously without mishaps of any kind. Then, the trim press operator will control the entire process up to his station.

The economics of the situation will then become:

1. Blank feeder to draw press *(3 men transferred)*	$4000
2. Iron hand for draw press	$3000
3. Turnover for trim press	$2600
4. Loader for trim press *(One man saved by items 2, 3 and 4)*	$5000
	$14,600
Production increase for press line	20%

The expense of items 2, 3 and 4 is justified by the production increase and the fact that the devices are classed as "automation equipment," not "automation tooling," and therefore will be amortized over several years.

Operation of Blank Feeder

A bundle of squared sheets is deposited on a roller conveyor by crane and shoved into the blank lifting section until the material hits alignment stops.

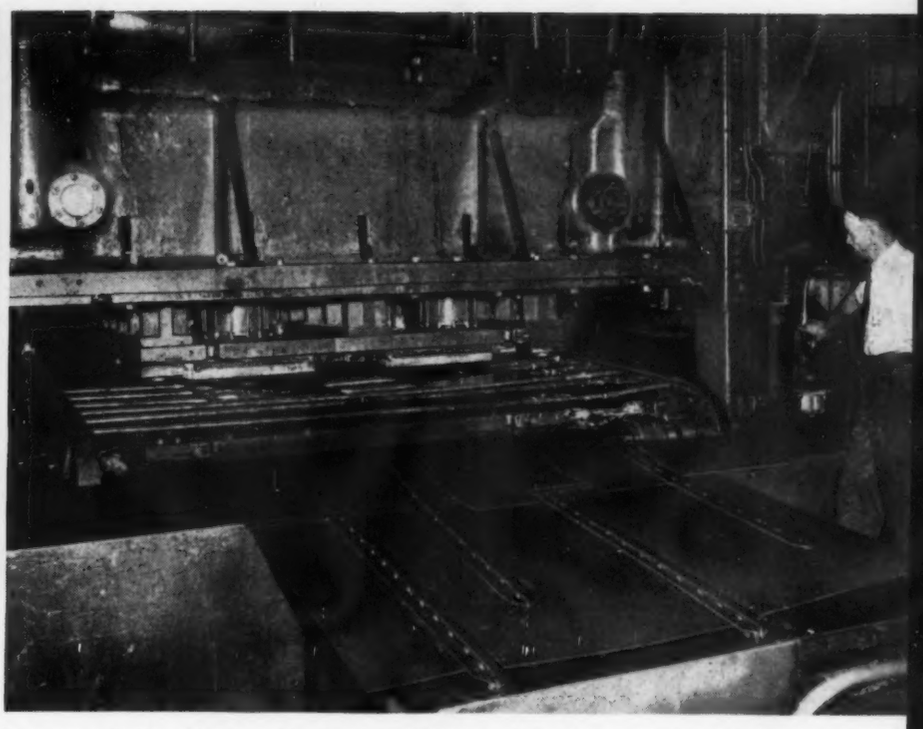
A rack attached to the blank holder drives the automation device. This rack fits into a rack carrier, or housing, free to pivot around a drive shaft with pinion keyed thereto. Thus, at various angular positions of the rack, the rack carrier pivots to suit, but the drive shaft turns a sprocket and chain combination which reciprocates the carriage. Actual transfer of the blank from position 1 to position 4 is done in steps by the carriage.

Assume the blankholder is ascending. Rack movement causes the carriage to move to the right, transferring a blank from position 3 to position 4. At top stroke, a limit switch is tripped, actuating the air cylinder at the blank lifter station. The platen bearing two vacuum cups descends and presses the cups onto the sheet until the limit switch is depressed. Thereupon, the platen rises, taking with it a blank and leaving room for the left end of the carriage to run underneath. Even for a 38-in. stroke of the air-cylinder piston, the down and up cycle requires only ⅛ sec.

On the down stroke of the press, the rack mechanically pushes the carriage to left and under the lifted blank. At the bottom of the stroke the carriage is in position, and it trips a limit switch controlling solenoids that actuate the suction release levers in the vacuum cups.

As the blank holder moves up again, the carriage moves the blank at position 1 to position 2 in the spray chamber. And the previously oiled sheet is transferred to the dies. On the next leftward stroke of the carriage, lugs on the carriage latch onto the sheet at position 2 and transfer it to position 3. Finally on the next stroke, the blank will reach the dies.

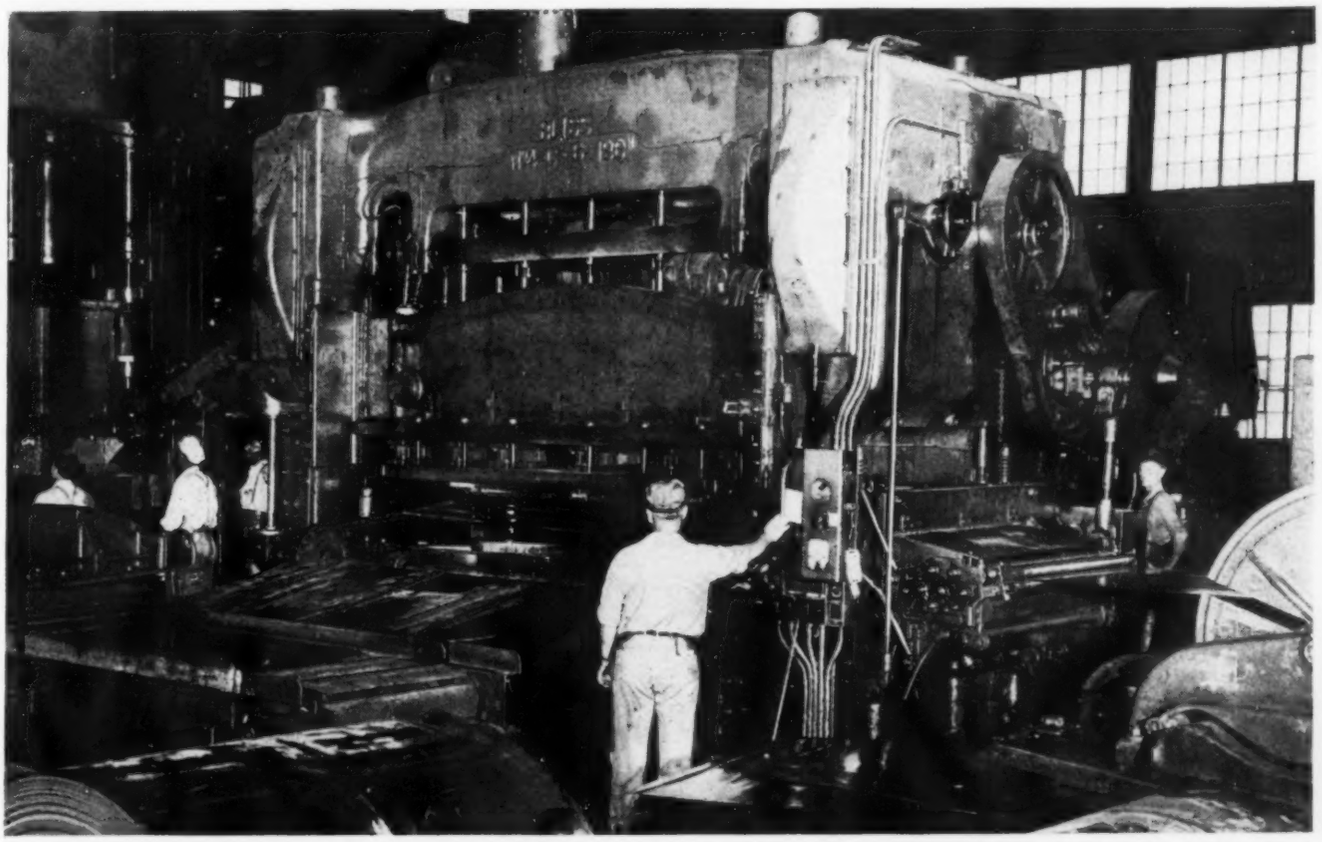
An advantage of the spray chamber is that spray guns can be located and timed to put the right amount of oil on desired areas.



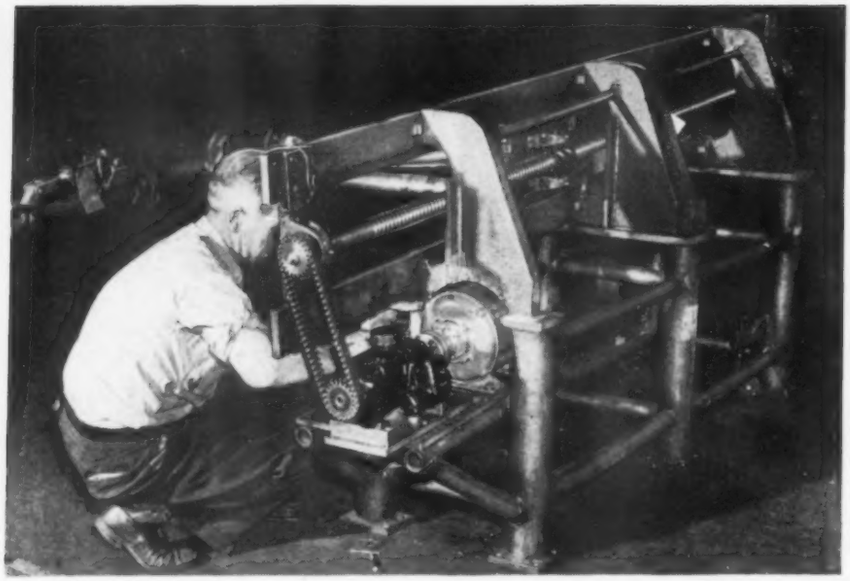
Blank-Extracting Devices

Belt Conveyor (left). Circular blanks drop through die onto crosswise belt conveyor built into bolster. Two rows of blanks are delivered to stacking devices

Bar-type Extractor (above right). Guides at ends of dies contain counter weighted chains with bars connected between them. Crank arm attached to crankshaft drives sprocket through miter gears to run bars into opening as punch rises. Vacuum cups release dash panel blank to bars, which run back out of way as punch descends. Panel is thrown clear onto roller table



Fender Blank Automation. One man controls setup involving: automatic coil-stock feed, blanking press, bar-type blank extractor. Panel slides down roller table to belt and is conveyed to roller leveler at left, then stacked convenient to fender draw presses. Setup is so productive it operates only part-time



Horizontal iron hands are a new development. They are needed for a situation where it is necessary to pull the production part out of the die parallel to the floor when die opening is limited or great care is required in stacking parts easily damaged if dropped. An hydraulic motor drives a leadscrew with "ball-bearing" nut to advance and retract the hand in relation to press movement

Iron Hands Have Stronger Grip

THE "iron hand" is a mechanical device used behind a drawing or trimming press to remove a stamping from the dies, after the piece has been lifted slightly by levers and rollers built into the lower die. Costing about $3,000, the iron hand permits transfer of one or more workers to more agreeable tasks. Besides, actual production of the press can be increased 10% at least.

When the iron hand is coupled with slat conveyors, turn-over devices and loaders, as the situation may require, the process of moving the stamping from one press to another is made automatic. Thus, only one control operator is normally needed between the two presses, instead of perhaps two to six persons engaged on handling tasks alone. Iron hands have been used mostly for large stampings to date, but their application to smaller parts is expected. A flange at least ¾ in. wide is needed for gripping.

When there is adequate room behind the press, and there is no peculiar condition in connection with gripping the piece, a vertically swinging iron hand is suitable. Otherwise, an iron hand that is attached to the press column and swings horizontally or a separate machine that withdraws the piece horizontally will be required.

Method of mounting vertical iron hands depends on press conditions. Some are attached to the press crown, others to the side frames, still others to a framework built onto the back of the press to clear obstructions. Ford uses two main types of iron hands: the first where arm movement is controlled by an air cylinder and cam; the second a purely mechanical type involving a cam or toggle.

Mechanical Hands

Operation of a typical iron hand is discussed in relation to Fig. 1. This device is attached to the press crown and is operated by a cam on the rocker shaft of a Bliss No. 410 toggle press. When the dies are closed, the cam roller is at the top of the cam on the rocker shaft. As the dies open, the rocker shaft turns counterclockwise. This series of events takes place:

1. The cam has a dwell until the dies open about 6 in. to allow entrance of the iron-hand jaws.

2. A limit switch on press is tripped, causing the jaw head to advance and grip the piece.

3. At the instant the jaws close, the roller starts to ride up the cam lobe, and the arm swings back.

4. At high point on cam, another limit switch, usually on press upright, retracts the jaws so they drop the part.

5. At downstroke of the press, the rocker shaft reverses and the arm swings back to position shown with its jaws adjacent to the closed dies.

Jaw Operation

Jaws of the iron hand are always air-operated. Shop line pressure gives a 90-lb. grip. To avoid smashing dies by accidental entry of the jaws, the head must be back on its track Fig. 2, and in contact with a limit switch before the press will operate. And at the waiting position before the dies, the jaws should clear them by about ¼ in. Sometimes, it is necessary to cut away the die block so that the jaws can reach the piece.

When the dies open about 6 in. on the next cycle, a limit switch on the press energizes an air valve controlling the jaw-operating cylinder. The cylinder advances the head about 6 in. on its track, whereupon the trip on the pivoting jaw strikes a stop. Continued head movement causes the jaws to close upon the stamping flange. The jaws retain their grip while the arm swings the piece back to the release point behind the press.

The iron hand in Fig. 3 is attached to the blankholder of a Clearing press. A slot cut in the arm allows the cam to pass through, a desirable condition when the spacing of presses is close. A counterweight takes the "bounce" out of the arm.

For presses like the Toledo No. 794½, the toggle-operated iron hand, Fig. 4, is preferred. The toggle is attached to the ram; the arm to a bracket on the upright. At beginning of upstroke, the end of the toggle is separated from the bumper pad about 9 in. Just before contact of these two, a limit switch actuates the jaws.

To minimize shock when the toggle strikes the bumper pad, the arm is equipped with a buffer cylinder having pressure on the piston-rod side. On the down stroke, the arm floats down against an air cushion, the air being released from the cylinder when a bracket trips a 4-way valve. This feature avoids bouncing of the arm on the stop bar.

Standard vertical iron hands require 5 to 8 ft. swing. The horizontal type, Fig. 5, has a 34 in. swing, is used for gripping a peculiar-shaped piece on a vertical wall. The arm swings on a vertical shaft into which a barrel cam is cut. A bracket attached to the ram has a roller engaging the barrel cam, thereby forcing the arm to swing according to upper-die movements.

Mechanical iron hand for Bliss No. 410 toggle press. Movement of the arm to and from the dies is controlled by a cam on the rocker shaft of the press

FIG. 1

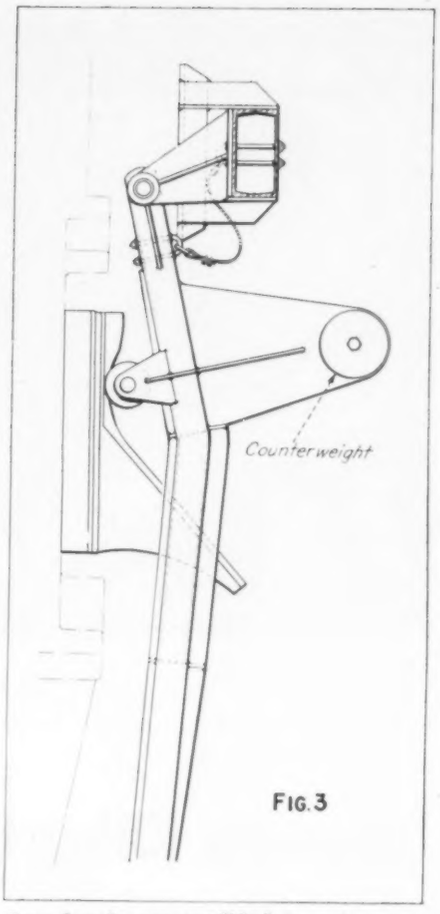


FIG. 3

Iron hands are modified to suit press construction. In the case of the wheelhouse (frontispiece picture), the iron hand is attached to the blankholder of a Clearing press

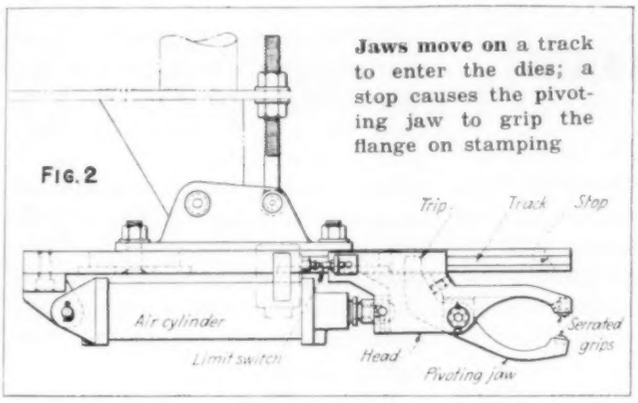


FIG. 2

Jaws move on a track to enter the dies; a stop causes the pivoting jaw to grip the flange on stamping

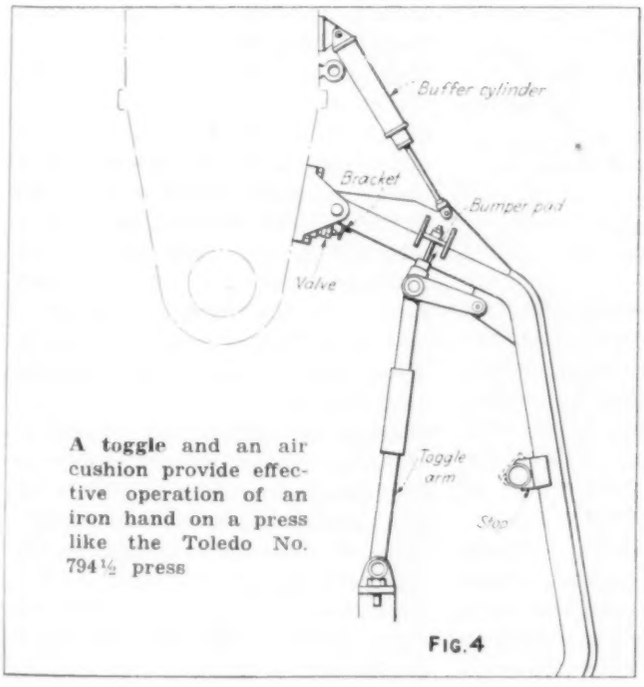


FIG. 4

A toggle and an air cushion provide effective operation of an iron hand on a press like the Toledo No. 794½ press

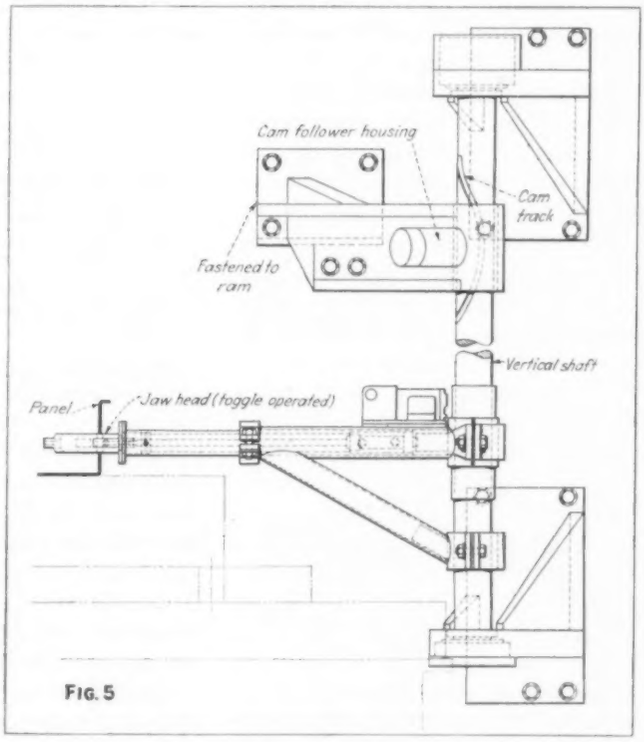
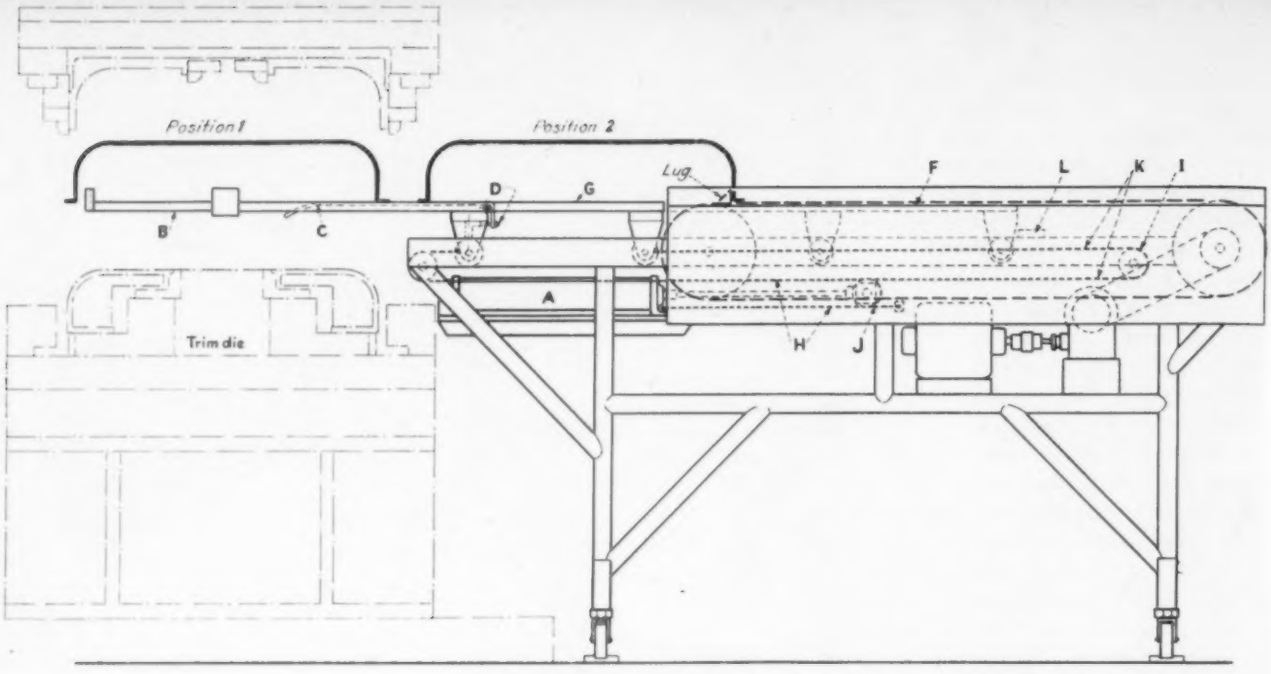


FIG. 5

For close quarters, a horizontally pivoting iron hand is useful, especially when the piece must be gripped on a vertical edge



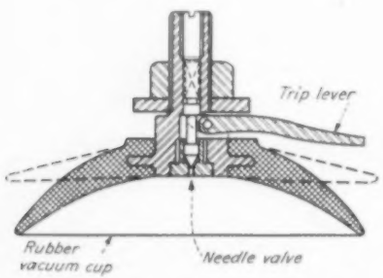
Wheelhouse at position 1 in trim die is pulled back to position 2 by arms *B* of unloader, whereupon lugs on continuously running chain conveyor F carry piece to the loader for the separating press

Unloaders (Other than Iron Hands)

AN IRON HAND will not serve when the stamping has been turned upside down, as in a trimming die. It is necessary to employ a means to hold the stamping in the upper die as it ascends, until a pair of arms can be run into the opening to receive the piece and put it upon a conveyor. An example of this form of unloader will be described with respect to the wheelhouse-stamping line. This line is equipped with automation devices to serve the drawing, trimming and separating presses (the stamping is cut out at the center in the trim die and cut into halves at the third operation).

Cost of these automation devices and what they accomplish with respect to the intelligent use of labor and the cost of the equipment may be summarized:

1. Iron hand for draw press.. *(one man transferred)*	$3,000
2. Slat conveyor and turn-over for trimming press..... *(One or two men transferred)*	$4,200
3. Unloader for trim press..	$2,800
4. Loader for separating press *(Items 2 and 4 permitted transfer of two men)*	$2,000
	$12,000
Production increases for press line	10%



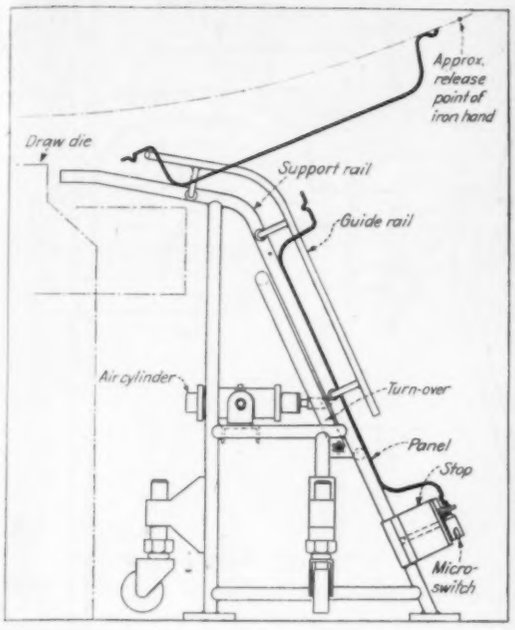
Two vacuum cups operated by a knockout hold the wheelhouse in the trim-die upper member until the arms of the unloader are in a position to receive it. Type shown is arranged for a blanking die

The trim die is fitted with two vacuum cups in the upper member. The trim die has a fixed knockout bar with pins that trip the needle-valve levers, breaking the suction. Note: In other types of dies, the knockout may be controlled by an air cylinder in the punch.

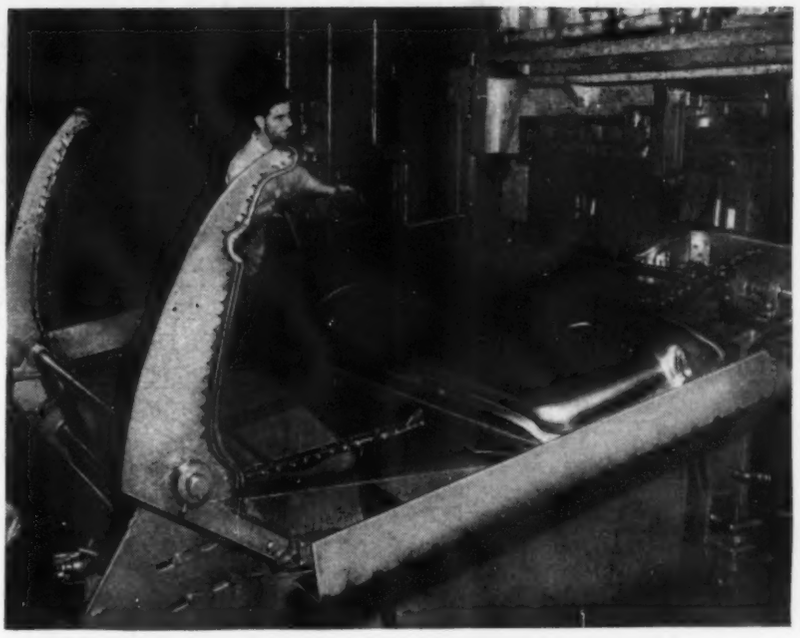
As the ram ascends, carrying with it the stamping, a limit switch on the press is tripped. In turn, air cylinder *A* in the unloader runs the arms *B* into the open die to receive the piece at position 1, as it drops from the vacuum cups. The piece depresses the spring lever *C*, which in turn trips limit switch *D* to return the arms.

This action hooks the leading edge of the wheelhouse over lugs on the chain conveyor *F*. Since the chain conveyor runs continuously, the stamping is moved right to the loading device for the separating die (page 120).

It is essential to obtain rapid in and out movement of the carriage *G* which incorporates the two arms. This is accomplished by chain drives driven by the air cylinder. Chain *H* is connected to the left end of the carriage, passes over a double sprocket *J* and is anchored to the cylinder housing. Chain *K* is attached to the right end of the carriage, passes over sprocket *I* and next over the double sprocket *J* and is anchored near the motor. Thus, when the piston rod is pulled back, chain *K* will pull the carriage to the right *twice* as fast as the piston movement and *twice* as far. Similarly, when the piston rod is extended to the position shown, chain *H* pulls the carriage to the left twice as fast and twice as far. A limit switch *L* prevents the press from closing until the carriage is in the out position.



By combining an iron hand, the turn-over illustrated and an elevator, between the draw die and trim die, two men were released to other work



In another form of turn-over, the quarter panel is dropped onto rubber rollers by an iron hand, comes to rest on pivoting arms. These are shown just after they have thrown the panel onto a chain feeder serving the trim die

Turn-Over Devices Avoid Awkward Effort

STAMPINGS must often be turned over between operations to suit the characteristics of the next die. This is often true between drawing and trimming. If the stamping is removed manually from the draw die and turned over, one or more men will be required for the operation.

In practically any situation involving normal or even close spacing of presses, turnover devices can be installed. These are used between an iron hand to remove the part from the draw press and an automatic feeder to put the turned-over stamping into the trim press.

It is essential that all three devices have interlocked electrical controls. Obviously, the draw-press iron hand must not be free to drop a panel onto one already on the turnover device, and the turn-over device must not put a panel onto the conveyor if the latter already has a piece.

Two types of turn-over devices are used. These are essentially the same in operation and differ only in the type of guiding means for the panel. For an outer door panel, or other exposed surface that must be finished at the least expense, the iron hand should drop the piece onto a chute equipped with rubber or cloth-faced rollers.

Turn-overs work this way:

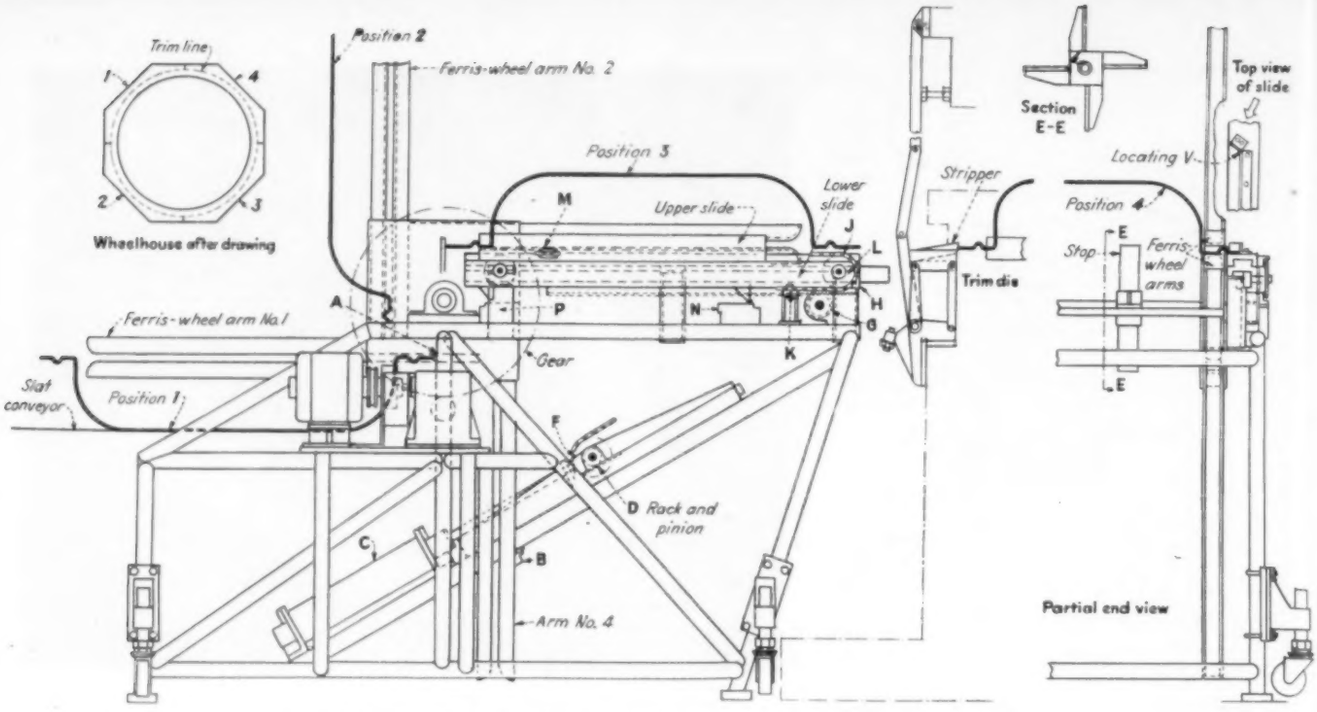
First: the iron-hand withdraws a stamping from the draw press. At the end of its preset stroke, the iron-hand jaws release the panel over the turn-over device. The rear end of the stamping drops onto the support rails, the piece tilts forward, and then slides down the chute to a stop. Here an edge of the panel strikes a microswitch.

Second: the turn-over device remains inoperative until the automatic conveyor (not shown) has fed its piece into the trim press. Now, the microswitch energizes an air valve controlling the air cylinder which actuates the turn-over mechanism. The piston rod moves out and in so doing pushes forward the throw-over device, which pivots in bearings. The stamping falls over onto the automatic conveyor (or elevator in some cases) and is picked up by mechanical means and carried to the loading position. If the trim press is open and the trimmed piece has been removed from the dies, the automatic feeder is free to place the turned-over stamping in the trim die.

Third: when the throw-over mechanism has reached the end of its forward stroke, the air valve automatically reverses the cylinder and the device returns to original position.

Turn-over for Round Stampings

The previously described turn-over device is satisfactory for stampings of a shape such that the turnover device and loader will feed the piece into the trim die in proper orientation for desirable scrap-disposal conditions. Example: a door panel. But there are parts, principally round stampings, that are not self-locating in the trim die for best removal of scrap. Thus, it is necessary to incorporate means in the turnover and loader to carry the piece along in a specific manner. The wheelhouse stamping is an example.



Wheelhouse stamping, upon leaving the draw die, is turned over by a ferris wheel and loaded into the trim die by a fast moving carriage

The draw die trims the flange on the wheelhouse stamping to an octagonal shape. Now the problem is to guide the stamping into the trim die so that the scrap will be parted into four pieces that will fall off the bolster into scrap chutes.

When the iron hand pulls the stamping out of the draw die, the piece is deposited on a slat conveyor. Guide rails on the conveyor constrain the part to move ahead without twisting out of alignment.

Automation control panel operates a group of presses and their automation devices through interlocked circuits, so that mishaps will be avoided

A ferris-wheel turn-over device receives the stamping from the slat conveyor, turns it over and places it upon a rack-driven slide. In turn the slide advances to push the turned-over stamping into the trim die, a stripper device restraining the piece while the feeding slide returns to original position.

Details of construction are: Assume the trim press opens to receive a piece. A limit switch on the press is tripped by the ascending ram, and the automation panel permits the turnover to operate.

Stampings are located at positions 1 and 2. Part at position 1 has tripped a limit switch *A*, stopping the slat conveyor so that another piece can not be advanced to interfere with indexing of the ferris wheel. Limit switch *A* also applies power to the motor-speed reducer that drives the ferris wheel.

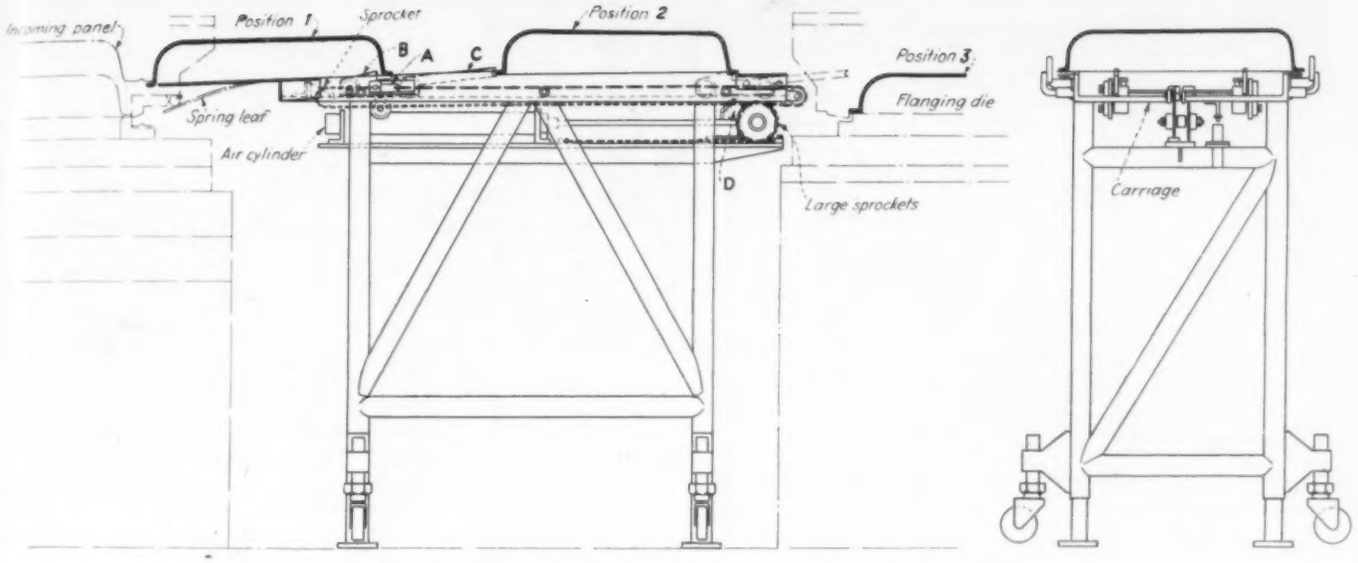
The ferris-wheel indexes 90°, raising the panel at position 1 to position 2. Stamping previously at position 2 has been dropped upside down on rack conveyor at position 3. Ferris-wheel arm No. 4 strikes limit switch *B*. In turn, power is supplied to a Rees friction relay, or plugging switch, that stops the ferris-wheel drive motor, arresting indexing motion. Simultaneously, limit switch *B* energizes an air cylinder C which operates the carriage.

As the air cylinder pulls back its piston rod, it retracts a rack *D*. Movement of the rack slide drives sprockets *F* and *G*, their ratio being 2:1. On the same shaft with sprocket *G*, there is a pinion which moves rack *H* to the right.

Chain *J* is anchored on the frame at *K*. As the lower slide and rack *H* move to the right, sprocket *L* turns freely. But since the upper slide is anchored to the chain at *M*, the upper slide must move to right twice as fast as the lower slide. By means of the two speed increases described, the carriage moves four times as fast as the piston rod.

When the carriage has pushed the stamping onto the trim die, the hinged stripper springs up and restrains the piece while the carriage returns.

Length of carriage stroke is controlled by limit switch *N*. It also reverses the air cylinder and returns the carriage to the original position. The carriage comes to rest against limit switch *P*. If this switch is not tripped the press cannot be operated, because of an interlocked electrical circuit.



Trimmed fuel tank stamping is pushed onto a spring leaf and hooked over a carriage dog. When the flanging die is ready to receive a piece, the panel in position 2 is delivered to the die, and the panel at position 1 is advanced to position 2

Loaders for Stampings

VARIOUS handling problems are encountered when loading stamped shells into trimming, parting or flanging presses. Several automation devices are described to show ways that good machine design will solve these problems.

Space is limited on the press line for making fuel-tank lower halves. Nevertheless, automation devices can be fitted to the room available, and production has been increased approximately 20%.

Fuel Tank Loader

A combination transfer table and loader is used between the presses that trim and flange the lower half of the fuel tank. The automation device is shown ready to begin a new cycle. It consists essentially of a carriage that is reciprocated by an air cylinder, using chains and sprockets to control the direction of motion at twice the speed of piston travel. The piston-rod end thus carries two large sprockets. Two small sprockets are mounted on the frame.

To obtain carriage motion to the right, the piston rod moves leftward. The chain controlling this motion is anchored at the right of the automation device, is wrapped clockwise around one of the large sprockets, passes over a small sprocket at right of frame and is anchored to the carriage at right of limit switch *A*.

To obtain motion of the carriage to the left, the piston rod moves right to the position shown. The chain controlling the carriage is anchored near the air cylinder, passes counterclockwise around the large sprocket, then over the small sprocket at left end of frame, and is anchored to the carriage at left of limit switch *A*.

The transfer device is shown ready to begin a new cycle. One trimmed panel lies at position 2, nothing yet at position 1. When the trim press opens, the trimmed piece is raised by arms and rollers in the lower die member. An incoming piece thereupon pushes the trimmed stamping to position 1 on a leaf spring of the transfer device. In fact, the piece is pushed far enough to hook over a dog *B* on the carriage and to depress limit switch *A*.

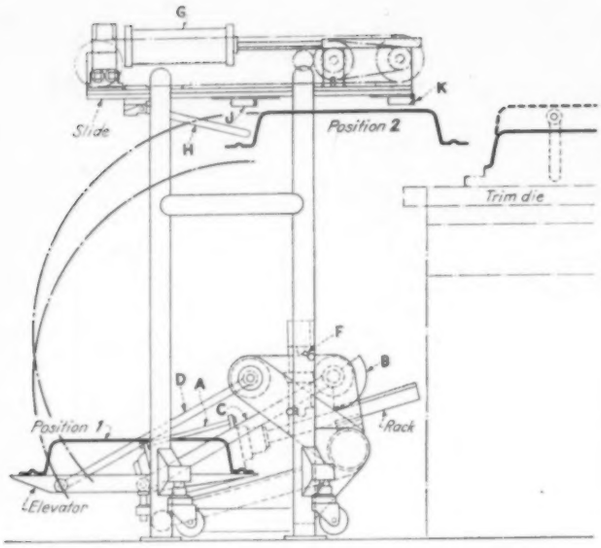
Since limit switch *A* is tied in with the electrical control circuit of the flanging press, nothing happens until the ram of the flanging press rises far enough to trip a limit switch. If switch *A* were to be operative at any time a panel is received, the carriage would advance and strike the flanging dies or perhaps enter them at the wrong time and smash the dies.

If the flanging press is open, limit switch *A* is free to actuate the air cylinder in the automation device. The piston rod retracts and the carriage moves right at twice the speed of the piston. The panel in position 2 is pushed by detent *C* into the flanging die, position 3, and the panel at position 1 is advanced to position 2. The flanged panel falls down a chute.

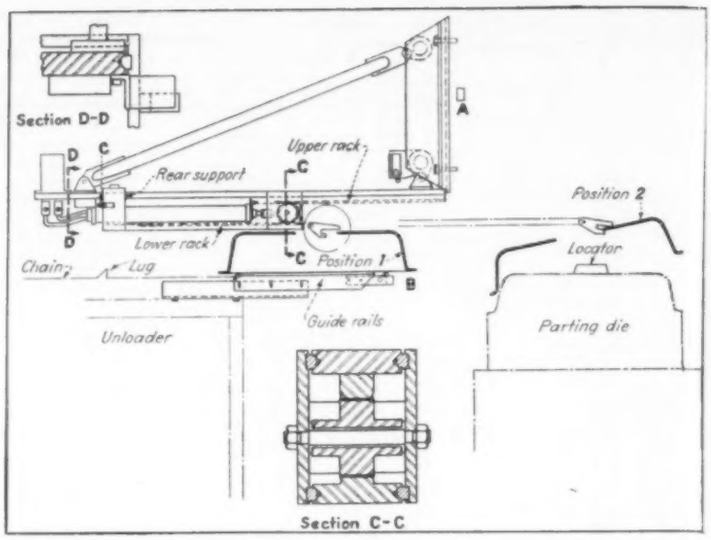
At the end of its rightward stroke, the carriage trips limit switch *D* to reverse the cylinder. Thereupon, the carriage returns at high speed, leaving behind the panel now in position 2, which is restrained by the pusher dog *C*. This automation device, at a cost of $4300, will permit the transfer of two men to other work.

Loader for Trim Die

As mentioned, space is limited on the fuel tank line. For example, the space between the draw press and the trim press is only 62 in., but three automation devices are installed—iron hand, turnover and



Despite limited space between presses, an automatic loader can be used in conjunction with other automation devices. To load a fuel tank stamping into the trim die, an elevator-type loader is used



A finger catches the wheelhouse stamping by the edge of the cut-out hole, and a piston-operated rack carries the stamping into the parting die

loader. The panel follows more or less of a U-shaped path. Limited space makes it necessary to use a loader that will elevate the stamping from a point near the floor and push it into the trimming dies. This system is used:

The turnover deposits the stamping upon an elevator at position 1. Here the weight of the panel depresses a limit switch.

If the press is opening, tripping of the switch causes actuation of air cylinder *A*. The cylinder in turn pulls back on a rack, thus rotating a sector gear *B* pinned to lifting arm *C*. Parallelogram linkage consisting of the elevator and arms *C* and *D* raise the panel to position 2.

Rotation of the sector gear trips limit switch *F* when the elevator is in the up position. Thereupon, cylinder *G* moves a slide carrying a hinged arm *H* to the right. The arm pushes the panel into the trim die.

The incoming panel pushes a trimmed panel out of the die. The previously trimmed piece is raised off the die by an air cylinder operating arms and rollers built into the lower die member. To avoid a jam, these lifting arms are retracted when the slide trips limit switch *J*. And when the incoming panel has been loaded properly, the slide trips limit switch K. Thereupon, both the slide and the elevator are returned to their original positions.

Wheelhouse Loader

The trimmed wheelhouse stamping must be cut in two pieces. When run out onto the conveyor of the unloader (page 116) the flange side is down. An elliptical hole in the bottom serves as a convenient pick-up point.

The loader consists essentially of a rack with a finger that drops into the elliptical cut-out in the bottom of the stamping, hooks over the edge of the opening and carries the piece tilted into the parting die. Details are:

A limit switch on the press restrains operation of the loader until the press ram is up. Meanwhile, the split parts of the previous piece are lifted out of the die by arms inside it, and they fall onto conveyors.

Limit switch *A* is tripped by the ram. Nothing happens unless limit switch *B* is depressed by a trimmed stamping delivered by the trim press unloader. Then, an air cylinder pushes a pinion, which rolls on an upper fixed rack and pushes the lower rack to the right at twice the piston speed. The finger carries the piece to position 2. Limit switch *C* is tripped by the rear support of the rack to reverse the air cylinder and pull the loading fingers out of the way of the ram.

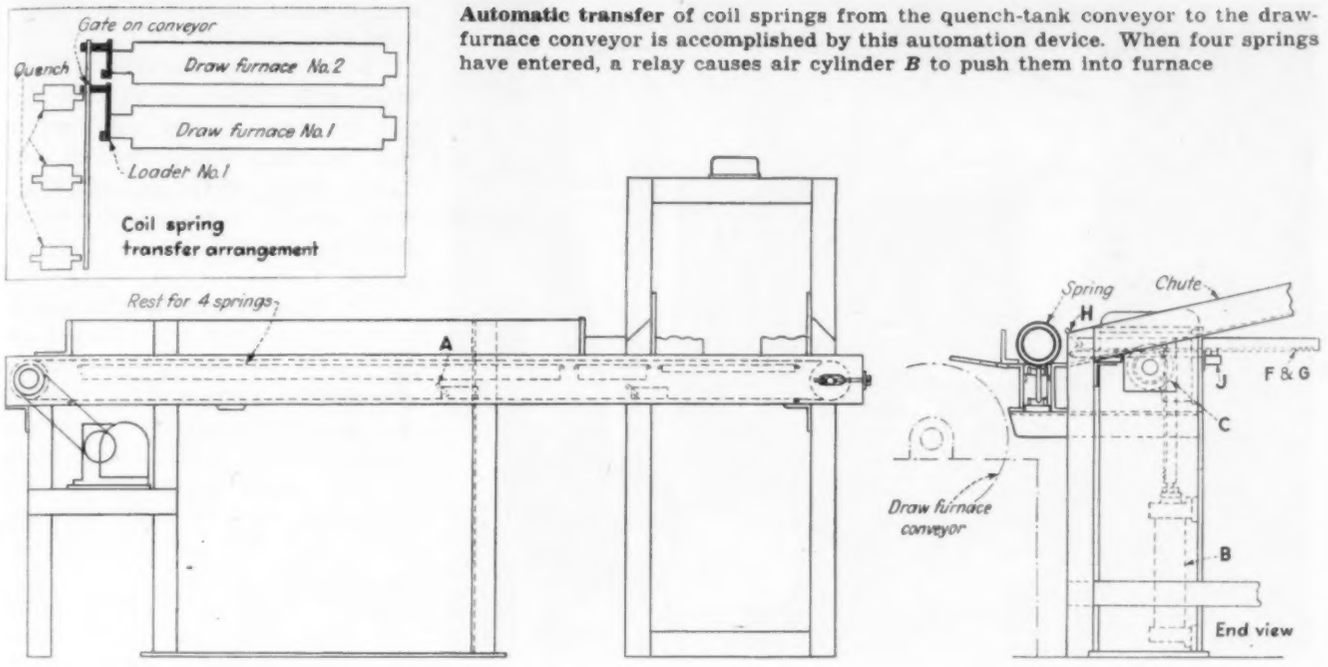
Loaders for Coil Springs

FORD'S THINKING along "automation" lines is being extended to car parts other than stampings. Three devices are to be installed in the coil spring plant at Hamilton, Ohio. The first example was requested by production supervisors as a means of overcoming a "mankilling" job.

Quench Machine Loader

For proper results the coil spring must be coiled and quenched in a few seconds. Besides, one spring end must not be displaced more than 5° in the compression fixture to obtain the correct characteristics.

To transfer the hot, heavy spring from the coiler to the quenching machine by hand involves: The man stands on a platform. He reaches down to take a coil spring when stripped off the arbor of the coiling machine. Then he turns 180°, lifts the spring to chest height



Automatic transfer of coil springs from the quench-tank conveyor to the draw-furnace conveyor is accomplished by this automation device. When four springs have entered, a relay causes air cylinder *B* to push them into furnace

and puts it into the compression fixture.

The loader to do the same work tirelessly in a 4-sec. cycle cost $3800. The hot spring drops from the coiling arbor and into chute *A* of the automation device, where it rolls down to the air-cushioned shock absorber *B*. Limit switch *C* is tripped and starts the cycle.

First, an indexing plate rotates the spring to the proper angular position of the critical spring end. An air cylinder operates a cross-wise rack for this purpose. Then a second air cylinder positions the piece axially so that it can be grasped by the jaws *D* of the transfer device.

Arms F and G constitute a parallelogram linkage that move the jaws in a clockwise direction until they are in position to grasp the spring and reverse the motion to carry it to the compression fixture of the quenching machine. Once the spring has been laid in position, the arms swing to a neutral position. Now the quenching machine is free to compress the spring the desired amount, index, and submerge the piece in oil.

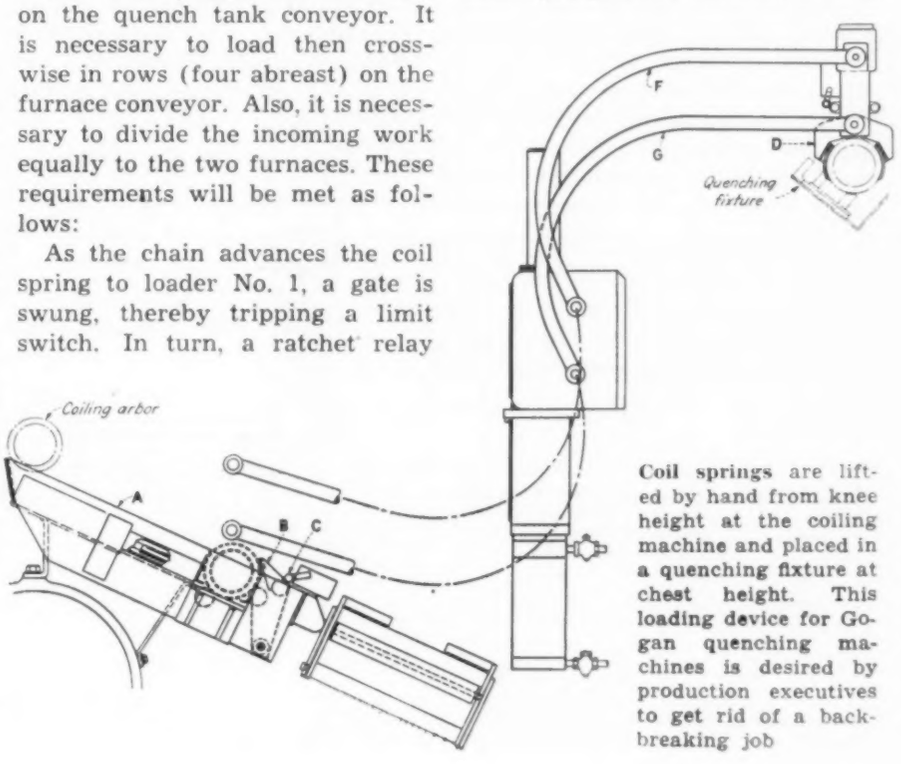
Furnaces Loaded Automatically

From three quench tanks, coil springs move via chain conveyor to two draw furnaces. Ordinarily, one man would be required at each furnace to remove the springs from the passing chain conveyor and lay them on the belt conveyor of the furnace. After installation of automatic loaders, each costing $4000, the men will be transferred to jobs requiring human skills. Besides, more uniform loading of the furnaces will be secured.

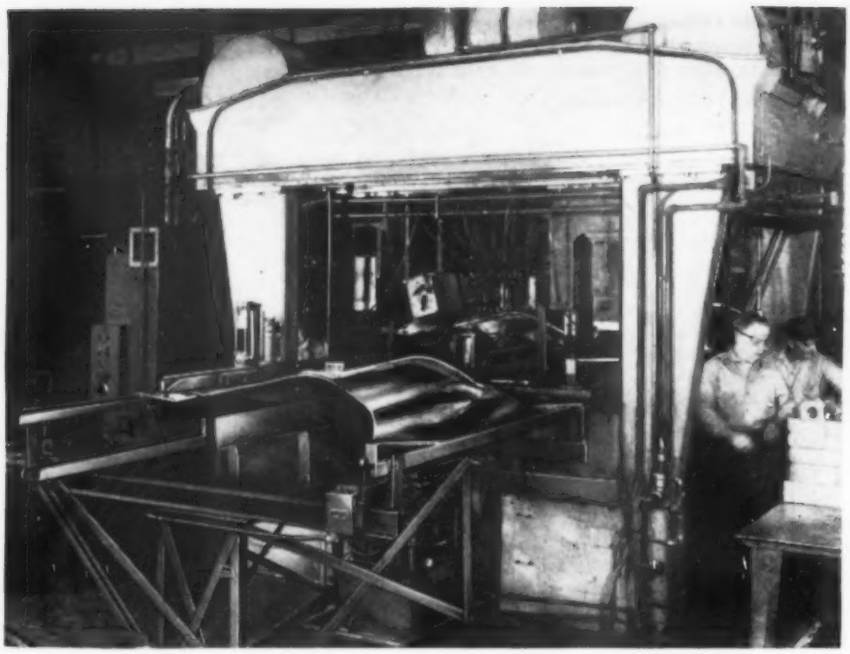
The coil springs travel axially on the quench tank conveyor. It is necessary to load then cross-wise in rows (four abreast) on the furnace conveyor. Also, it is necessary to divide the incoming work equally to the two furnaces. These requirements will be met as follows:

As the chain advances the coil spring to loader No. 1, a gate is swung, thereby tripping a limit switch. In turn, a ratchet relay allows an air cylinder to kick the coil off the conveyor and into a chute serving loader No. 1 The next spring goes by to loader No. 2, where it is kicked off the chain.

Each loader is fitted with a continuously moving chain. The piece coming down the chute is dragged by the chain to a stop, the next follows. Each spring trips a switch to index a ratchet relay *A*. When four springs have entered, a relay



Coil springs are lifted by hand from knee height at the coiling machine and placed in a quenching fixture at chest height. This loading device for Gogan quenching machines is desired by production executives to get rid of a back-breaking job



Two welding machines that apply spotwelded brackets and subsidiary parts to the floorpan are served by a common loader. This device, consisting of several rails with dogs, takes the panel from the restrike die and transfers it in five stages through the two welders

closes the circuit controlling cylinder *B*. Now the push into the furnace starts.

Cylinder *B* pushes a rack which, through pinion *C*, causes a shaft to turn. The shaft is fitted with two pinions and these in turn move racks *F* and *G*. As the racks advance, the angle-iron pusher *H* forces the four coil springs on the chain to roll up an incline and onto the belt conveyor of the furnace. Limit switch *J* now operates to return the automation device to its starting position.

Shot-Blast Loader

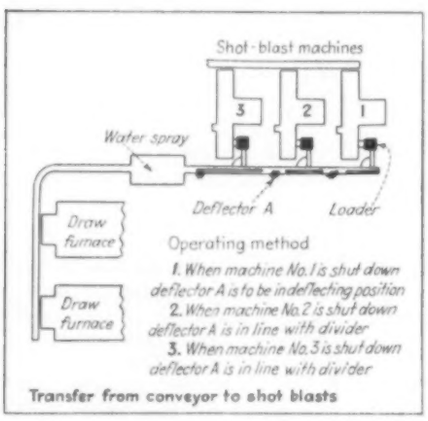
Coil springs are discharged from draw furnaces onto a two-lane conveyor that goes through a water wash and then passes three shot-blast machines. Only two of these machines are in operation at any time. Ordinarily two men would be required to pick springs off the conveyor and load the machines manually. By installation of three automatic 90°-turn and loading devices, each costing $2700, one man will be able to oversee the shot-blasting operation and perform other tasks.

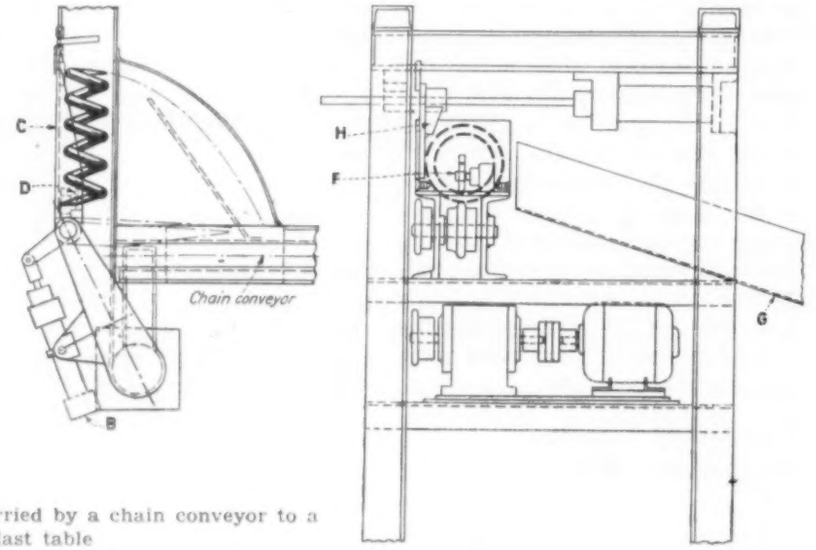
The two-lane conveyor will be fitted with deflectors so that the two machines in use will receive the incoming work divided between them. These deflectors always push the springs to the inside channel ahead of the pick-off points.

The transfer and loading problem is this: First, the spring must be turned 90° to suit the crosswise chain conveyor of the automation device. Second, when the spring reaches the discharge point of the automation device, the workpiece must be held there until the shot-blast conveyor is ready to receive it.

When the spring coming down the inside lane reaches the take-off point, it hits a limit switch. Air cylinder *B* operates a linkage that swings the sweep *C* to the right to turn the spring 90° and deposit it on the chain conveyor of the automation device. Finger *D* prevents the spring from rolling; it is swept into position. And a time-delay relay holds the sweep in the right-hand position until the conveyor has taken the spring.

When the spring reaches position 2, it hits limit switch *F* and remains there until a dog on the shot-blast conveyor has tripped an interlocking switch. Now, since the machine is ready to receive a spring, the sweep *H* pushes the spring into the chute *G*. The spring rolls down the chute and onto power rollers of the shot-blast machine.


Shot-blast machines
3
2
1
Water spray
Deflector A
Loader
Draw furnace
Draw furnace
Operating method
1. When machine No. 1 is shut down deflector A is to be in deflecting position
2. When machine No. 2 is shut down deflector A is in line with divider
3. When machine No. 3 is shut down deflector A is in line with divider
Transfer from conveyor to shot blasts



After being turned 90°, coil springs are carried by a chain conveyor to a loader that releases a spring to the shot-blast table

ROUND TABLE

Face-to-Face — or Back-to-Back

"I happened to drop in over to Billings' place the other day, Ed," volunteered Al, "and I was invited to sit in on their monthly assembly."

"Assembly?" said Ed, rather puzzled. "We used to have those things down at old Swingum High; I never thought that they had any place in industry."

"Sure, it was an assembly," laughed Al. "The whole working force was assembled in the recreation hall after the lunch hour."

"What's the so-called assembly? Is it a show for the boys?"

"No, Ed, it was no show," smiled Al, "unless you can call some sound advice a show."

"What do they do, get an outside speaker to discuss the world problems—or was it one of those crackpot 'ologists explaining to the non-listing boys about that diamond-studded road to success?"

"There you go again, Ed! Can't you cultivate an open mind for a change? I'm telling you, Old Man, this thing I saw really opened my eyes."

"Well, open mine; what's the idea of keeping me in the dark?"

"Who do you suppose came out on the platform and spoke to the boys?" asked Al, with increased enthusiasm. "Nobody less than old Billings himself!"

"Billings! Don't you think he's making a big mistake, mixing with his men like that?"

"Why shouldn't he, Ed? They're his employees and I feel that a good heart-to-heart talk will do more to cement the bond of loyalty than anything else."

"No, Al, what he's doing is breaking down the influence he has by coming out in the open. To me, there's a certain advantage in being a little standoffish. There's a certain respect he can command by—oh, let us say, by his iron curtain."

"That doesn't bear out with the facts as I heard it from a couple of the men, Ed. He gave just a plain talk about business conditions and the policy of the company to meet them—nothing highbrow. And it went over well with the boys in the plant."

"Ah, horsefeathers, Al," sneered Ed, "all those guys are interested in is the do-re-me; they don't pay any attention to that stuff."

SHOULD THE "OLD MAN" *talk directly to the men, or should he have skilled go-betweens? In other words, is the old-time direct-contact method of men like "Charlie" Schwab obsolete? Other readers will appreciate your ideas and opinions; discussions of earlier topics appear on later pages.*

CARBON BLOCKS SIMPLIFY WELDING JOBS

Machining time on welded repairs can be substantially reduced by using carbon plates, blocks and rods to mold the shape of the weld

BY PHIL GLANZER

CARBON in the form of blocks, plates, rods and paste has long been a useful element in the welding shop and ranks high on the list of welders' aids. In adding metal where the deposit must be confined to definite proportions or maintain a definite shape, carbon is invaluable for preventing the metal from exceeding the set limits, the metal being molded, as it were, by the carbon forms. A welder may succeed in accomplishing the same results without such forms, but he must necessarily take more time for the job.

Vertical welds on cast-iron machine parts, for example, can be made with a minimum of trouble by the use of this technique. After the edges have been beveled, a carbon plate about 1 in. thick should be placed at the lower end of the chamfer with its face fitting tightly against both sides of the casting. This will form a pocket in which to work, the carbon keeping the molten metal in position as fusion is made to the sides of the chamfer. It is necessary to complete one section, and then place another carbon plate on top of the first, and continue. After the weld has advanced to some extent, fire brick may take the place of the lower carbon plates, so these are used only where welding is being done. To make sure that the plates are not forced out of place by the weight of the molten metal, bricks may be piled against them to support and keep them in place.

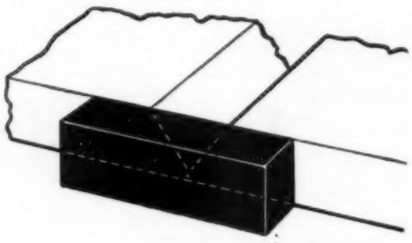
If steel plates or firebricks are used in place of carbon plates, difficulty may be encountered from the steel sticking to the weld metal and causing a hard and uneven surface; firebrick tends to melt and also forms a hard, uneven surface; moreover, slag from the brick may enter the molten metal. Carbon, however, will leave the metal with a smooth clean finish without hardness.

The difficulty usually encountered in building up broken gear teeth is to control the molten metal when starting to build up the bottom of the tooth. Endeavoring to get proper fusion is apt to result in the metal being spread over the rim toward the adjoining teeth and makes considerably more work when finishing the tooth to final shape.

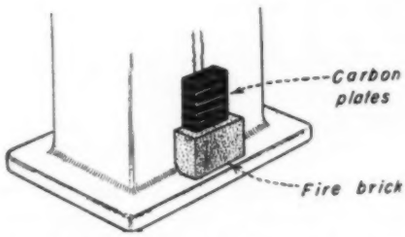
The use of pieces of carbon cut to fit against the base of the tooth will save much time in finishing and will allow the operator to be certain of complete fusion of the weld metal into the rim. In preparing such forms, they can be shaped by fitting them between two unbroken teeth.

When part of the spoke of a wheel is missing, a carbon block may be shaped to form a mold, and metal added from the welding rod to cast another piece. If the metal is added to the end of the broken spoke and also extended to and joined to the rim or hub in one operation, contraction strains will be set up as the metal cools and a fracture may result. The metal should, therefore, be welded to the rim or hub and extended out to the desired length, then allowed to cool. The two spoke ends can then be welded together in the conventional manner.

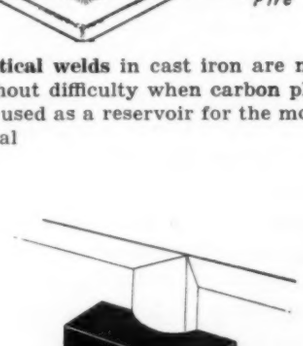
When machining operations are



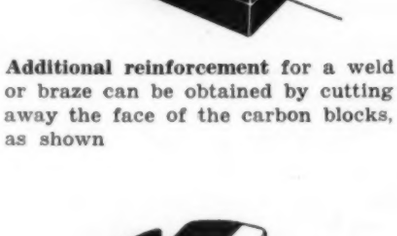
Carbon block placed at the end of a butt weld will prevent the metal from flowing out and will produce a smooth end with little or no machining



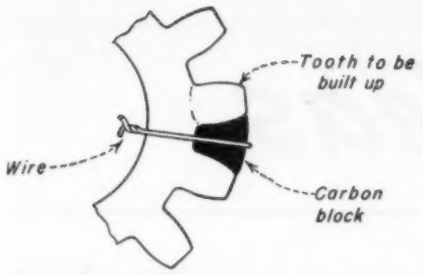
Vertical welds in cast iron are made without difficulty when carbon plates are used as a reservoir for the molten metal



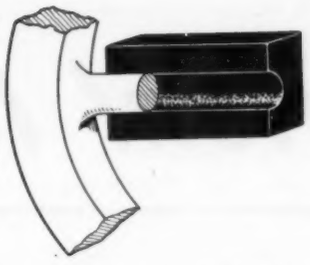
Additional reinforcement for a weld or braze can be obtained by cutting away the face of the carbon blocks, as shown



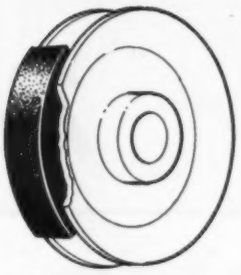
Broken gear teeth can be built up by using two carbon blocks shaped to occupy the adjacent tooth spaces



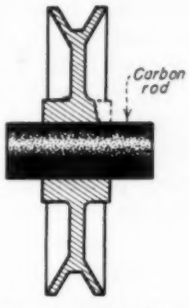
Ample support for building up a gear tooth in the horizontal position can be obtained by a single carbon block shaped to suit



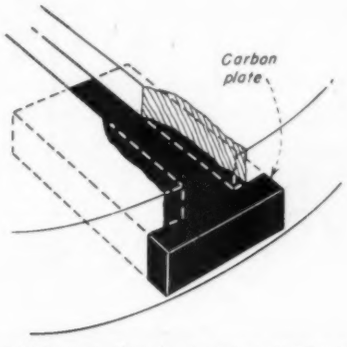
Carbon mold makes it possible to build up a missing section of a part such as a spoke of a wheel by depositing weld metal



Broken pulley flange can be repaired by roughly filing a carbon block and then rubbing it in the groove to obtain the exact shape



Carbon rod inserted in the bore of a pulley permits building up a broken hub without seriously affecting the bore



Repairing a chuck, broken along the dotted lines, becomes a relatively easy matter when the bottom of the slot is filled with a carbon plate

Machined as shown, a carbon plate is useful for butt welding round work. Holes serve to hold other jobs in a vertical position

difficult or impossible through lack of machines or tools to finish the job, carbon plates can be of the utmost value. Broken T-slots, for example, could be built up by filling in with solid weld metal, but without proper equipment the machining of the T would be a difficult proposition. A carbon plate, however, carefully fitted to slide into the bottom of the slot, makes the repair a fairly simple job and the edges of the vertical part of the slot can be smoothed up with a file after the plate has been removed.

Breaks frequently occur through a hole, and while it is easy to fill up the hole it is not always easy to get the exact center to make a new one, or the exact position and size if the hole is not round. A carbon rod of correct size inserted in the original hole removes any difficulty in this respect, as the shape of the hole is preserved when the break is welded.

When a break occurs through a tapped hole, it is often possible to make a repair without losing the thread. The broken parts should be clamped together with the male threaded part in place. This is then screwed out, which will true up the thread and a carbon rod of the proper diameter is screwed into place. It is not necessary to thread the rod as the thread will be cut in the soft carbon if it is screwed in carefully. After the rod is in place the edges of the break should be beveled either by grinding or burning, and the weld made in the regular manner. If a tap of the correct size is available it should be run through the hole to remove the slight flash at the edges of the repair. If no tap is available, a small groove should be chiseled down the line of the break.

A flat carbon plate is also useful for small welding jobs. When such work is handled on a firebrick-topped table there is always danger of the brick melting and spoiling the weld by inclusion. In setting up a job on a carbon plate it is advantageous to use carbon paste to prevent relative movement of the parts. A quantity of paste is put on the plate and the work gently pressed into it; by heating the paste with the flame, it will harden and no movement can take place until the job is finished. The paste may be kept handily in an ordinary grease gun and is always ready for immediate use.

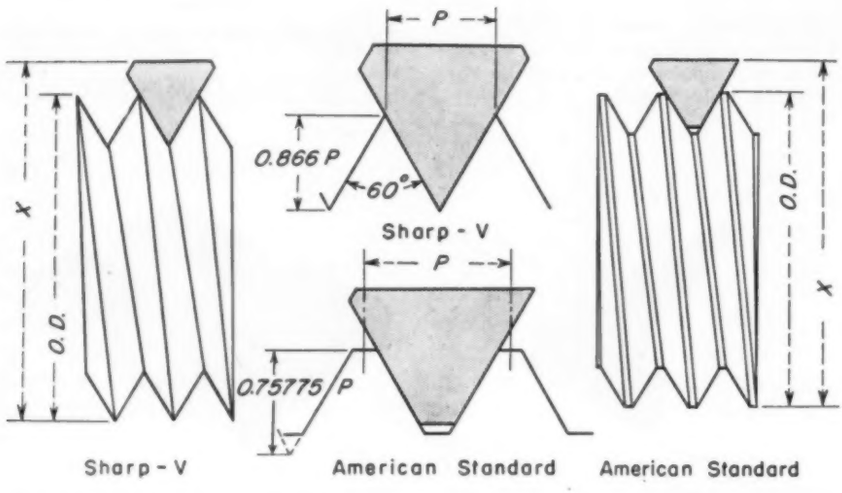
Another useful tool is a carbon plate in which two V-grooves have been machined at right angles. A hole is drilled through at the point of intersection to give clearance for welding, and a number of other size holes are drilled in the flat surface to hold parts in a vertical position. It also facilitates right-angle joining operations.

Feed Rolls

CARBOLOY Co., taking its own prescription, is using solid carbide feed rolls on a #2G B & S automatic screw machine—and getting ten times the wear of steel rolls. Two types are used, a V roll with driving keyway and tapped setscrew hole, and two sizes of flat rolls. The V roll is 2⅛ in. dia. by 1⅛ in. wide; the flat rolls 2⅝ in. or 2⅛ in. dia. by ¾ in. wide. These handle bar stock from 5/32 to 1 in. in diameter.

Steel rolls handled 4,700 ft. of stock before reconditioning; carbide rolls handled 50,300 ft. the first year and have not been reconditioned thus far.

Practical Ideas



Adapter for Sharp-V and American Standard Checks Diameters

Sharp-V and American (National) Standard screw threads can be measured accurately with a micrometer and the illustrated adapter, which is made from an old three-cornered file.

The adapter is ground down flat and smooth on the three faces and cut off to about ½-in. length. The faces must be exactly at 60° to each other, and the final dimension from the one sharp edge to the face opposite is 0.38 in. This is stamped on the end of the adapter to prevent mixups. The other two edges are ground off parallel to the opposite faces to allow the adapter to be seated in American Standard threads, whose roots and crests are cut back ⅛ of the pitch.

Since direct measurement of odd-threaded screws is not possible, the adapter is employed for checking diameters of single, triple, etc. threads. The sharp-V is measured by setting the sharp edge in a root and measuring across from the exposed adapter face to the crest on the opposite side of the thread. The true O.D. is found by subtracting the 0.38-in. constant and adding 0.866 divided by the number of threads per in. to the measurement, or:

$$\text{O.D.} = \text{X} - 0.38 + \frac{0.866}{\text{N}}$$

where X is measured and N is the number of threads per inch. This, in effect, adds the width of the adapter and subtracts the theoretical full depth of thread.

The American Standard O.D., is found in a similar manner:

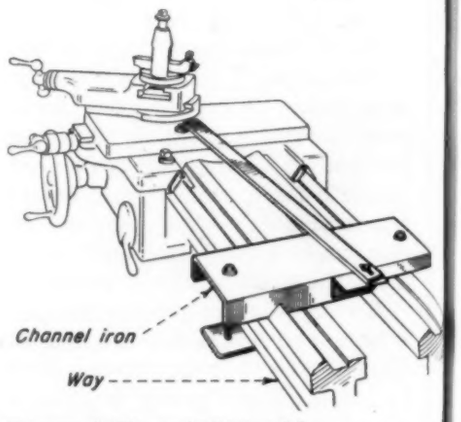
$$\text{O.D.} = \text{X} - 0.38 + \frac{0.75775}{\text{N}}.$$

Here the constant 0.75775 is equivalent to ⅞ of the 0.866 constant. This is due to the fact that the American Standard crest is only ⅞ of the full triangular height, or ⅛ has been cut back. This variation occurs only on the side of the thread that carries the adapter, so only ⅛ must be accounted for.

This system has been in use for many years, and I have never produced one sharp-V or American Standard thread that could not be measured and checked by it. Accuracy is limited only by the micrometer and the precision of the adapter, and, of course, the skill of the mechanic.

Actually any known size can be substituted for the 0.38-in. dimension and unusually large or small threads may require a variation. However, care must be taken to use a short length of adapter because on a thread with a large helix angle, the adapter must hit bottom, or be flush to the thread sides on an American Standard, to produce accurate measurements.

Charles Shope, Washington, D. C.



Tapered Thread Cut with Bar and Roller

In our shop we recently had the problem of turning a number of threaded parts having a taper of 18°. As the threads could not be turned with a compound and the taper attachment, we had to construct a special setup.

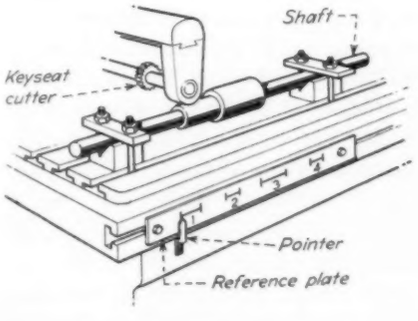
A piece of channel iron was milled to fit over the lathe ways with two bolts screwed through it

and into a plate underneath to clamp the iron. A section of angle iron was slotted as in the illustration and was bolted to the web of the channel. The slots made it adjustable from side to side.

A stout, rigid bar was bolted to the top of the channel at the required 18° angle. Against this rolled a roller bearing that was bolted to the top of the slide. The cross-feed was disconnected during threading, although the main feed screw was engaged.

On all but light cuts, pressure had to be maintained against the bar through the roller by hand. Since the work was set up in the machine between centers, and not at an angle, the thread pitch was exactly that engaged with the feed mechanism.

After the return stroke the slide had to be pushed back against the bar. Depth-of-cut adjustments were made with the compound. The bar was mounted slightly higher than the surface of the slide to prevent rubbing. *K. W. Thompson, Franklin Square, N. Y.*

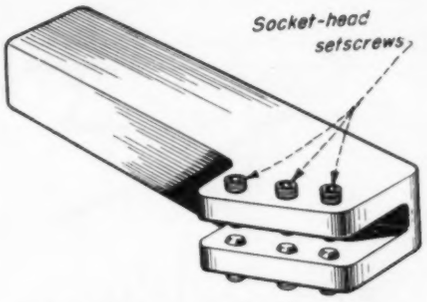


Datum Plate Locates Keyways

Job-lot keyseating was speeded in our shop by setting up a reference plate on the edge of the milling-machine table. A pointer bolted to the machine indicated which seat was being cut and when the operator had to drop the table to stop the cut.

The shafts were mounted on V-blocks and were clamped down. The first piece of the lot was located by measurement, and the plate was marked in the correct places for four keyways. After the first run, the operator ran the table up to a predetermined setting, engaged the traversing feed and stopped each cut when the pointer came to the end of the mark.

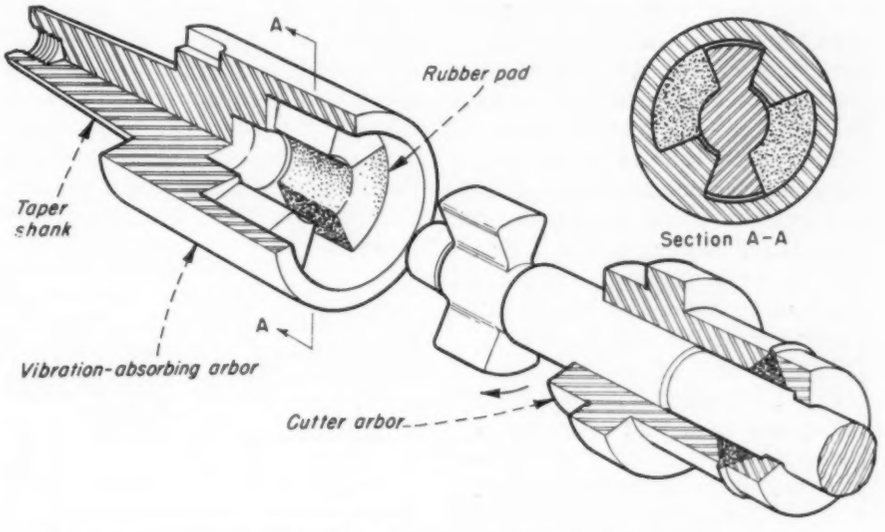
This system made rapid production possible, although the quantity was not enough to warrant a special fixture and setup. *John K. Smith, Holbeck, Leeds, England.*



Toolholder Handles Double Duty

This toolholder is suitable for both left- and right-hand operation. The six setscrews provide enough holding power to clamp toolbits considerably smaller than the maximum size and the holder will take.

With suitably ground toolbits, the holder can be set up for turning, boring and facing operations, and is strong enough for heavy cut-off work. *Frank Lovejoy, San Diego, Cal.*



Rubber Pads Cushion Gang Milling Setup on Arbor Extension

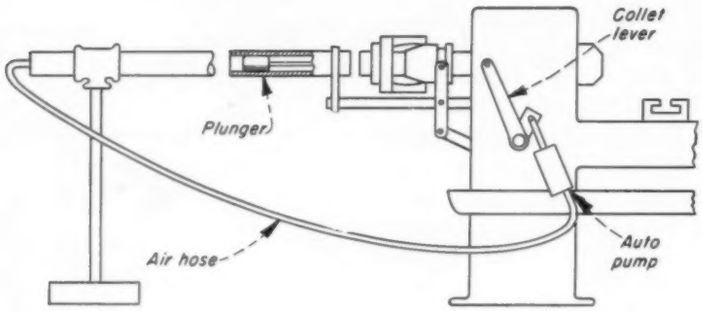
Chatter in milling cutters causes rapid dulling of the blades and needless wear and tear to the machine. On a gang-milling setup we encountered this trouble, so I designed and built a special arbor that absorbed the vibration.

The arbor was conventional except at one end, with four cutters mounted at the required spacing for the job. A taper-shanked yoke at the end fitted over a two-tooth keyed section of the main arbor. This section was held in place by ground surfaces that rested on sleeve bearings in the yoke and in a retaining cap.

A leather packing ring was added between the retaining cap and a steel ring on the arbor to keep coolant out of the driving joint. This protected the two pieces of firm rubber that took up the force of the backlash in the arbor when variations in pressure would ordinarily cause chatter.

Since the drive was from the cushioned end, positive rotation was assured through a metal-to-metal contact. Any reverse force was directed against the rubber pads, which absorbed it gradually.

The smooth running of the machine that resulted from this setup assured good alignment and long life of the parts and mechanism. *G. R. Milner, Gainsborough, England.*



Pneumatic Plunger in Turret Lathe Replaces Bar-Feed Mechanism

We recently bought a small turret lathe which had parts missing from the bar-feed mechanism. Rather than try to guess what the original parts looked like, we removed the mechanism and installed our own design of air-power stock feed.

The 13-ft. tube is ⅛ in. larger than the machine capacity (⅞ in.) and contains a free-fitting plunger 2 in. long. A snug-fitting fork on the machine supports the end of the tube so it may be removed for loading from the machine end.

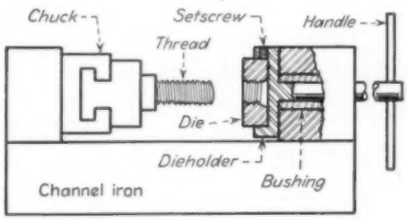
The outer end of the tube is plugged and fitted with an automobile-pump hose that connects to a pump mounted on the machine and attached to the collet lever. Opening the collet with the lever caused the pump to operate and build up a pressure behind the plunger. This forces the stock out against a suitable stop near the collet.

We think this mechanism works better than the original setup since there are no screws to tighten and an "overfeed" can be easily corrected by a light push against the air pressure. *Donald E. Eaton, Worcester, Mass.*

Drill Ground with Pilot Works Soft Sheets

I recently noticed a method in Practical Ideas for drilling thin sheet metal. Some time ago I had to drill 0.020-in. copper stock and had to cast around for a suitable method to avoid grabbing and distortion.

After trying various ways of grinding the drill, I hit upon the illustrated form. This duplicates the action of a circle-cutter or a piloted fly-cutter. The pilot on the drill point enters and holds down the sheet until the edges engage and cut the hole. *H. Scala, Fair Lawn, N. J.*



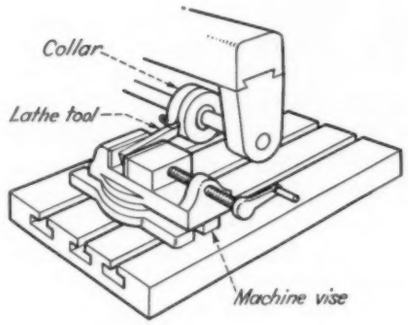
Reversed Button-Die Setup Threads Shouldered Studs

General shop repair work and machine rebuilding often calls for threading short studs completely down to a shoulder. This is impossible to do with button dies unless they are reversed, and if so, they are practically impossible to start on the work.

Instead of going through the lengthy process of starting the threads in the normal way and reversing the die later, I devised a small dieholding mechanism. This allowed me to use the dies reversed, but since the centers of die and work were rigidly coaxial, little trouble was had in starting the thread.

A piece of channel iron was the base, and a block at one end held a shaft with a handle. The shaft was turned from solid stock, and a dieholder was machined at one end. This held most common button dies, and bronze bushings allowed the use of smaller dies. A bronze bushing was inserted in the block as a bearing for the shaft.

An old two-jaw chuck was bolted to the other end of the channel, making sure that the centers were lined up. Work up to the capacity of the clearance hole could be chucked. *Harold W. Cutting, Lompoc, Cal.*

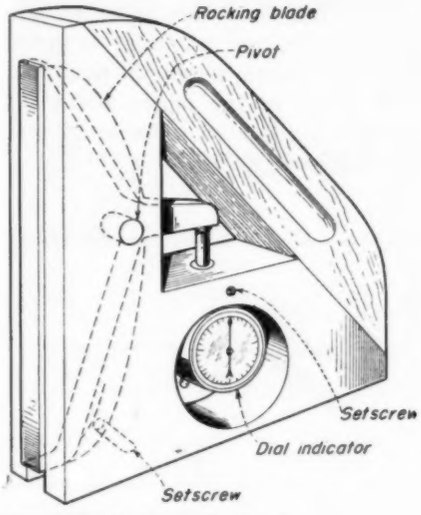


Milling-Machine Turns Collar

In a large shop it is often a waste of time to send small, special parts to the lathe section for minor turning work. The illustrated collar, for example, had to be turned down to a smaller O.D. than it was originally for use on a milling setup. The turning job was done on the milling machine.

A standard arbor was set up with the collar clamped in the cutter's usual position. A standard round-nose lathe tool was clamped in a machine vise on the table and was elevated to vertical center of the collar. A swivel base allowed the tool to be aligned in any required relation to the collar. With normal lathe speeds and feed approximated through the milling-machine drive and table traverse, the collar was turned to size in a short time.

Although this method is hardly practical for regular production operations, it can be employed to an advantage for short, simple jobs that would otherwise hold up production. *L. Deresh, Harrison, N. J.*



Pivoting Indicator Tool Checks Vertical Angles

A squaring gage that will give a dial-indicator reading without adjustment of a setscrew is illustrated. This advantage over the gage illustrated in a recent Practical Ideas section by D. P. Campbell is provided by locating the pivot opposite the center of the test gage.

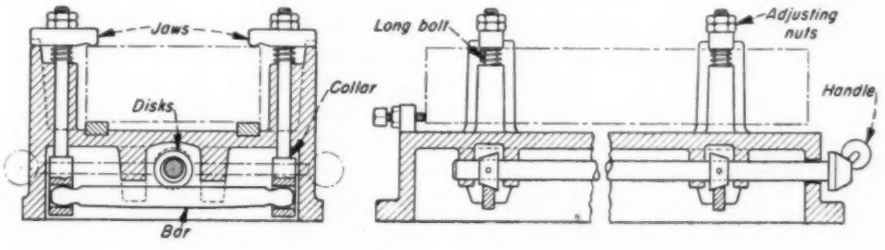
Although a setscrew is provided for holding the rotating member at an exact 90° to the base—the member is held in that position by its weight—indications of non-square surfaces can be taken by simply pushing the gage against the surface being checked.

The dial is set at zero when the edge is square. This can be easily done by holding it against a known square surface plate. All test readings are then either plus or minus . . . indicating the slant of the surface. *Harry Smith, Long Branch, Ontario.*

Drill Sleeve Confines Whipping

Small drills can be kept from breaking by accurate location over centerdrill marks, but even accuracy will not prevent bending in the drill if it is long. A metal sleeve, attached with a fairly tight fit, will stop this bending and reduce breakage.

The sleeve should have a wall thickness of about 1/16 in. and a length from the drill chuck to the lowest point on the drill that is exposed when full drilling depth is reached. The device thus also provides a good stop for drill feed. *Hugh F. Spinks, Birmingham, England.*



Four Clamps Set by Tapered Cams

The illustrated clamping fixture was originally designed for a cylinder-head drilling job. It allows clamping four jaws at the same time with but one rotating handle. Although it is probably best employed with a long, flat part, the heights of the clamping posts can be changed for odd shapes.

The long bolts pass through four posts in the casting and screw into collars that fit over the ends of two cross bars. These bars are rectangular in cross-section and are beveled off on the top to mate with the surfaces of two eccentric disks. The bars are confined in a vertical slot in the base.

Two eccentric disks pinned to the operating shaft are rotated by a handle at the end of the fixture. As the handle is moved to closed position, the eccentric disks bear down on the bars which pull down the clamps. A taper on each disk allows the mechanism to center.

To facilitate removal of clamping pressure, the clamps are spring-loaded. Adjustment is made through two lock-nuts on each clamp bolt. *F. W. Duce, Dudley, Worcestershire, England.*

$25 *In addition to regular payment*

for the best PRACTICAL IDEA

An extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS — Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

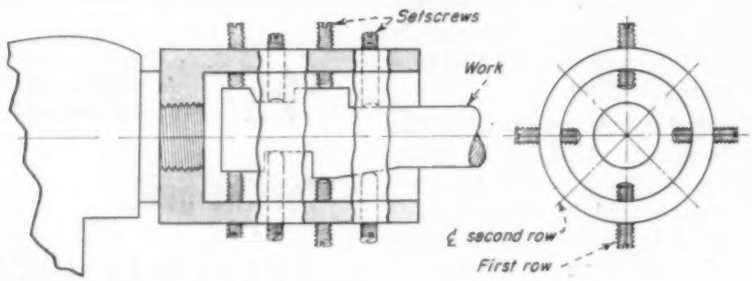
WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER — Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 18, N. Y.

62ND WINNER:

H. Yarrow

Shaft Indicating Leaf

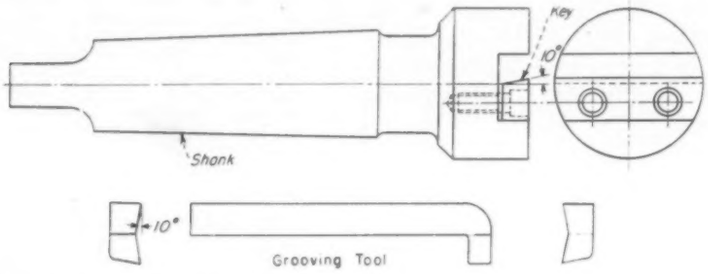


Setscrew Chuck Grips Odd Shapes

A large number of parts that must be re-worked or re-made for maintenance work cannot be easily held in regular chuck jaws. To handle these odd-shaped pieces, a special chuck was made.

A length of round stock was chucked in a lathe and one end was drilled and tapped to fit the spindle nose. The part was reversed and it was turned and bored out to the illustrated shape. Four rows of holes for setscrews were drilled and tapped in its periphery. The rows were staggered, so that one row was rotated from the other at 45°. This permitted gripping parts with practically any shape, as long as they were within the capacity of the chuck.

The first chuck worked well, so a total of three were made with 2-in., 4-in., and 6-in. openings. Work must be set up with some means of indicating or truing, so that all screws can be turned down tight with the work centered. *Tyler G. Hicks, New York, N. Y.*

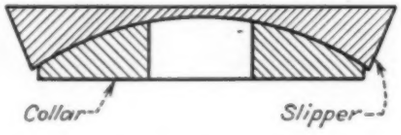


Key Clamps Grooving Tool

The grooving tool illustrated proved to be useful for machining out circular grooves in cast-iron and steel pump frames. The frames were first milled on an Ingersoll slab-milling machine, and the tool was then inserted in one of the spindles and the grooves were cut in the same setup.

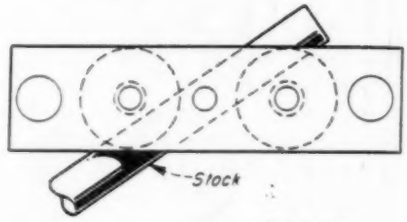
The method of clamping the tool was of particular advantage. It was clamped by a wedging key that was adjusted by two socket-head setscrews. The tool shank had the opposite taper milled on its face that mated with the wedging key. The clamping was secure, and permitted unlimited lateral adjustment with little loss in rigidity. This allowed cutting grooves of various diameters.

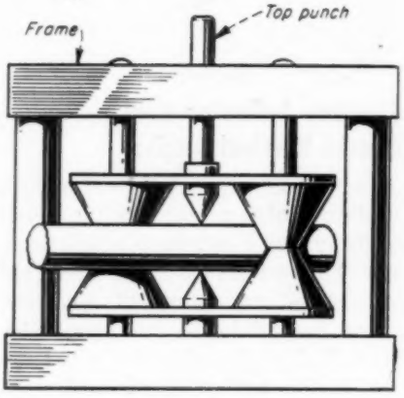
The tool shank was flush with the end of the arbor, which permitted setting up with the shortest possible amount of overhang. This reduced torsional strain and chatter. *R. H. Bergmann, Milwaukee, Wis.*



Toolpost Slipper Clears Chips

This toolpost slipper is self-clearing of chips. The collar is machined with a convex radius on the top. The slipper itself is turned out with the same radius. Since the mating edges point down, chips cannot fall onto the collar to jam the slipper, and any dirt between the two parts tends to drift out and down to the edges when the slipper is adjusted. *Charles Shope, Washington, D. C.*





V-Tapered Rollers Center Bars for Punching

Common shop practice often calls for marking round bar stock with punch marks on opposite sides of the stock. This device enables the machinist to do the job without any of the usual fussy procedure of measuring.

Two V-tapered rollers are mounted on two vertical stationary spindles with drilled plates bolted to them, top and bottom. The plates are to keep the rollers aligned so their centers are always at the same height.

A fixed punch pressed into the bottom plate of the fixture and a movable punch through the top plate do the marking. Bar stock of any size up to the capacity of the aperture is held in the fixture as illustrated to be punched. Force is exerted by hand against one end of the stock to keep it firm against both rolls and centered. After the rollers and stock are aligned with the stock resting on the lower punch, the top punch is struck with a hammer. *H. Moore, Leeds, England.*

NEWS OF METALWORKING

Progress of Plastic Industry Features Show

NEW YORK—Challenges were issued to plastic producers, users, and machinery and equipment makers at the Third National Plastics Exposition at Grand Central Palace Sept. 27-Oct. 1.

The show, which attracted 39,000 members of the trade, was the largest and most successful one held to date. Approximately 133 exhibitors utilized 90% of the floor space made available. Thousands of plastic articles were displayed, but producers of the various materials maintained that design engineers could make even greater use of the materials on hand.

In turn, the design and product engineer called for plastics which would meet a wide range of specifications, including greater strength, ability to resist all types of weather conditions and easier molding characteristics.

Now the plastic-product manufacturers are demanding all types of machinery and equipment which will produce and handle the materials along the same lines as production equipment for metals. The machinery and equipment manufacturers are striving to meet this challenge as evidenced by the number of machine-tool builders who have developed injection and compression molding machines comparable to those used in diecasting. Still more speed, however, is required by the users.

Army and Navy speakers at the Remobilization Program sessions of the Society of the Plastics Industry urged extensive study by the industry of plastics for war use. Replacement of strategic materials as well as improved equipment for the armed forces was held as the goal of the service representatives.

Dr. Lucius Gilman, Ordnance Department, Picatinny Arsenal, asserting that his branch of the service bought during the last war a greater dollar volume of plastics than any other branch, claimed that lack of data is handicapping a wider use of the material.

"Many companies," Dr. Gilman said, "have been understandably reluctant to release information which they have spent thousands of dollars in obtaining, but I believe that when the utility of this information to the Ordnance Department is understood and when proper precautions are taken in connection with dissemination of such information, the best interests of each supplier and of the molders as a group will be seen to be served by making this information available to the Ordnance Dept."

***OPENING DAY** of the Third National Plastics Exposition at Grand Central Palace, New York, attracted more than 7,000 visitors, with a total of 39,000 for the five-day show from Sept. 27-Oct. 1*

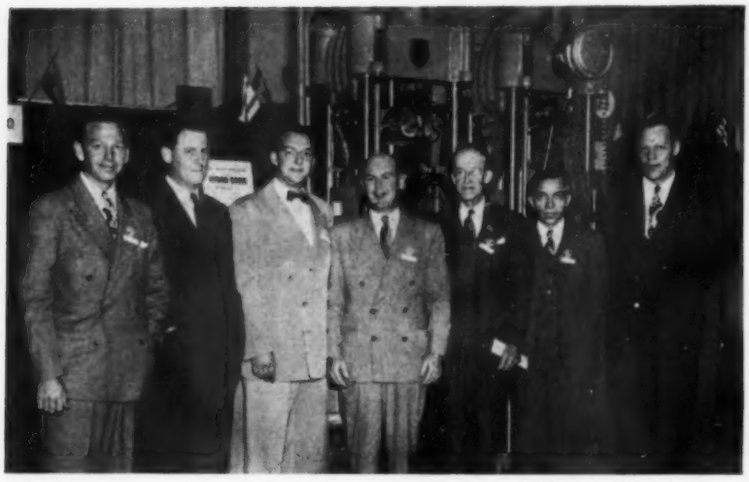
Standard engineering data and advanced engineering data, including such items as impact data, should be given to the Armed services, according to Dr. Gilman. However, "commercial molders are gradually developing new techniques and information along these lines will assist greatly in enabling the Ordnance Department to utilize fully the most advanced methods available to the industry."

Any information regarding the control of tolerances to a greater degree than at the present is needed badly, he said.

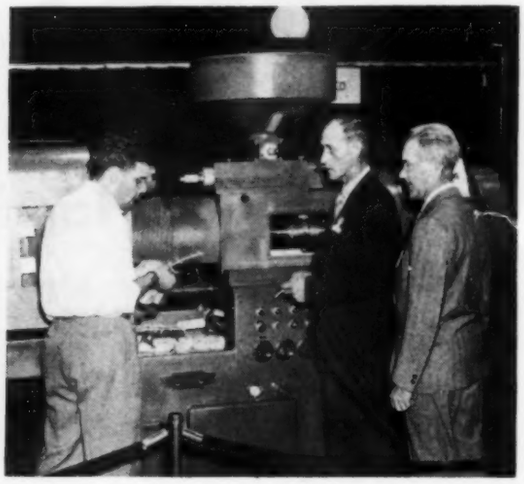
"Tropicalization, winterization, miniaturization and ruggedization might be used to define the efforts of the Signal Corps Engineering Laboratories, Fort Monmouth, to improve the performance of synthetic resins and plastics as applied to components and equipment over which the Signal Corps has been assigned custodianship," Emile McK Beekman, chemical engineer, SCEL, pointed out.

Covering thoroughly all types of plastic materials problems facing the Signal Corps, Mr. McK Beekman reported that one of the Princeton research groups had been successful in developing a glass fabric melamine resin laminated material which meets all of the requirements EMH-1 material in accordance with specification JAN-P-13. "Many of the members of the plastics industry who are engaged in the manufacture of thermosetting laminated sheets and plates have received copies of "Suggested Procedure for Development of Improved EMH-Type Laminates" and several of the company members have actually prepared sample sheets

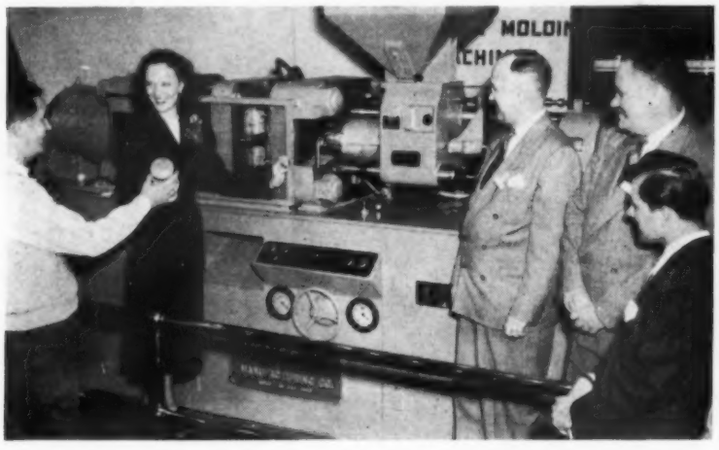
(Continued on page 134)



Thomas Ford, sales engineer; W. S. Renier, mgr. Plastic Division; Theodore Lorenz, service engineer; Ralph J. Kraut, president; S. L. Little, adv. mgr.; Frank Kraus and Lewis Peeke, all of Giddings & Lewis, are shown in front of the company's new 5-oz. vertical injection molding machines



C. W. Burnham, designer of the machine and B. L. Ward, supt. of machine design, watch operation of the Fellows-Leominster 5-A-10



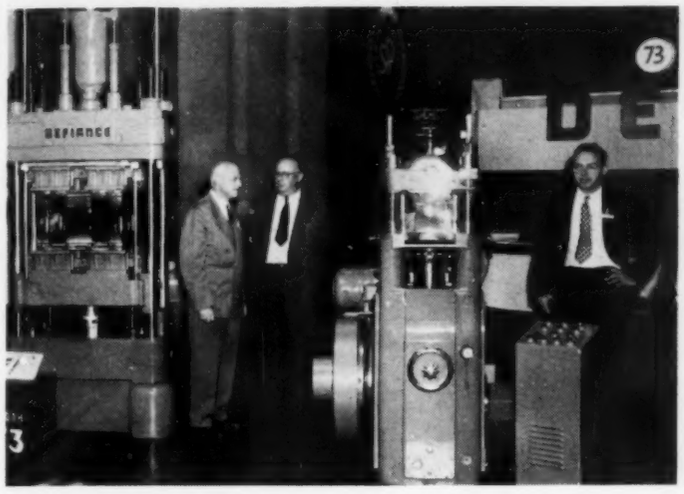
H. J. Miller, sales manager of Hydraulic Press Mfg. Co., and R. W. Powell, advertising manager, watch operator, Nell Reilly, hand plastic item to visitor. Machine is 4-oz. injection molder 125-H-4R

John E. Currier, New York representative, and J. R. Wheeler, vice president of Standard Machinery Co., study E. J. Stokes Machine Co.'s pre-form plunger molding press at the show

L. R. May, design engineer, takes a plastic item from operator of Model 3 semi-automatic injection molding machine manufactured by MacRay Engineering Co., as H. B. MacInnes, partner in the concern, looks on

B. J. Moslo, vice president of Moslo Machinery Co., operates 1½-oz. Minijector molding machine; in background, Fred Stanley, engineering editor of Modern Plastics, and E. P. Moslo, president, discuss show

Molding Machines, Other Equipment Shown



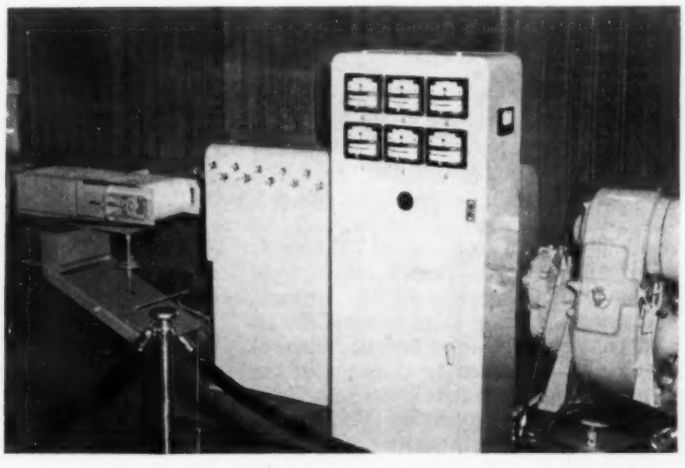
G. P. Anderson, gen. sales manager, discusses Defiance Machine Works' new 170-ton Tri-Dyne molding press, with W. L. Phyfe, sales engineer. R. E. Klinger, Jr., stands next to the Model 20 pre-forming press

Thousand-ton hobbing press, manufactured by Elmes Engineering Works of American Steel Foundries, attracted considerable attention at the Show. A model of the hydraulic system is on table at left

F. W. McIntyre, Jr., vice president of Reed-Prentice, and George W. McIntyre, New York district sales manager, are shown with the operator of the company's 25-A-4 injection molding machine

Nathan Lester, president of Lester-Phoenix, Inc., right, watches the company's LP ½ injection molding machine produce Plasti-Rivets for Shakeproof exhibit where these rivets were used to assemble a T-square

Model H-200 plastic injection press of 1-oz. capacity s shown in the booth of the Van Dorn Iron Works Co.



Thermoplastic Extruder, No. E-6-1, and other equipment were shown by Modern Plastic Machinery Corp.

(Continued from page 131)

in accordance with the instructions given therein. If continued testing proves that the present indications regarding this material are thoroughly justified, the industry will be depended upon to meet the procurement requirements of the armed forces for this material."

Laminates are used for terminal plates which are used to insulate high-frequency circuits and are required to possess high insulation resistance and low dielectric loss characteristics.

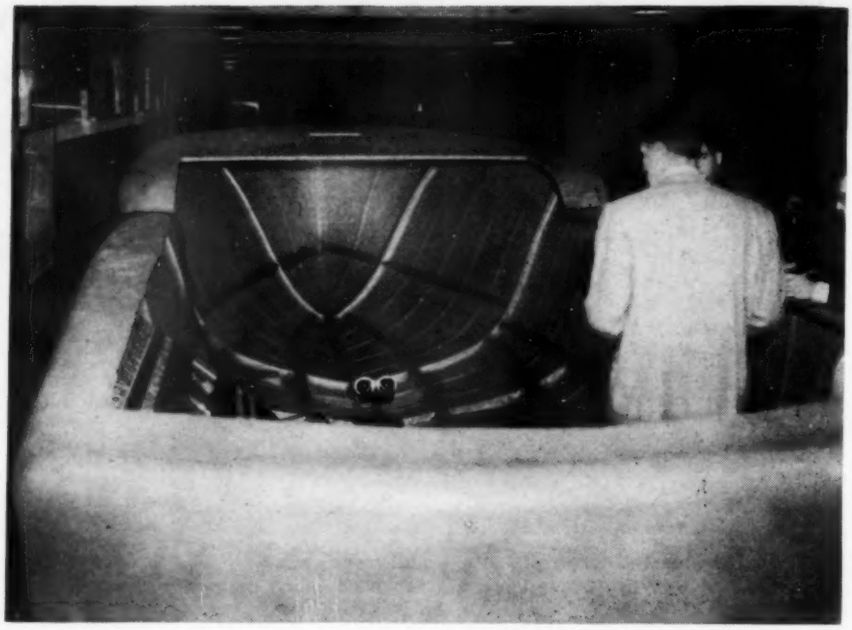
The Quartermaster Corps approached the use of plastics upon getting the best utilization of each material in each specific application, Dr. Warren Stubblebine, research director, Chemical and Plastics Division, stressed. "It is not a matter of substitutes. We are trying to find materials which do each job best."

Discussing specific applications of plastics, Dr. Stubblebine said that probably the "outstanding single application of the melomine tableware is that found in the Pentagon Building in Washington where several hundred thousand pieces are in daily use. One problem with the tableware is the scratching which occurs when a sharp knife is used in cutting on the surface. Another has been coffee staining. In the latter case we have at least a partial solution but the scratch problem remains."

For future work, Dr. Stubblebine said, the replacement of strategic materials offers an answer to many military problems and it presents a challenge to the plastic industry. "Studies on design and structural properties on many of our items will probably show us at least a few places to start but again all of you can help by giving the matter some thought. And, finally, if you have any contribution to make in the form of technical advice, new ideas or just plain criticism of any of our items, do not hesitate to call us on it. It is our Army and your money—we can use your help and perhaps we can help."

Selection of the plastic to be used in a part is to blame for failures, not the plastic itself, I. L. Rosenheim, chief of the Materials Section, Army-Navy Electronic and Electrical Standards Agency, told the assembly.

"Sometimes it is because of insufficient knowledge of the capabilities and limitations of the plastic as is the case when women attempt to iron garments with plastic zippers, or when a molder tries to mold Saran in conventional equipment without making the necessary changes in the metal used in the hot zone portions of the injection machine. Sometimes it is because of improper design of the molded part, such as sharp edges or corners without adequate fillets. But most often it is because of insufficient knowledge of the requirements of the application as is the case when an 80 deg. instead of 60 deg. pvc compound is used for wire insulation, where sub-zero temperatures are encountered.



***PERSONNEL BOAT,** built for the Navy, was made of a Fiberglas T-36 mat and Selectron Resin. It is 28 ft. long and 10 ft. 3 in. wide. A two-part aluminum mold was used and it took eight men six hours to complete the plastic hull. The boat attracted considerable attention at the National Plastics Exposition*

Mr. Rosenheim pointed out that specifications and standards groups in industry and in the government are providing standards of performance against which to evaluate plastics. "They work together to improve such standards and specifications, to make them more efficient, to increase their significance, and to eliminate divergence between the difference groups.

"The users," he said, "of these standards of performance must make full use of them. They must be aware of their shortcomings and advantages, and of their significance. They must be able to interpret results correctly, and use them intelligently. They must, in effect, follow the work of standards groups and take part in it, if the standards are to be made as efficient and as useful as needed to provide the plastics required to perform successfully in the field."

The expanding interest of the Chemical Corps in plastics has resulted in the recent establishment of a modern, well-equipped, plastics laboratory at the Army Chemical Center, Fred B. Shaw, Chemical Corps, Technical Command, Army Chemical Center, reported.

This laboratory, according to Mr. Shaw, is completely equipped for the synthesis of materials, but it is mainly intended for development work on items and components to be fabricated from commercially available resins and plasticizers. Facilities for grinding, compounding, injection and compression molding, and film forming are provided. Already this laboratory has fabricated or molded dozens of experimental models of frangible phenolic detonator retainers for smoke tank closures, cellulose nitrate igniters, polytetrafluorotheylene valve seats, special-purpose gaskets, polymethyl methacrylate disk computers, cast allyl resin lenses, and plastic filter frames.

"In the near future," he said, "it appears most probable that the enlarged scope of plastics in the field of engineering will result in further applications arousing no more general curiosity or interest than the application of any of the common metallurgical alloys."

Design of shipboard electrical and electronic equipment and components involve the following major objects—highest possible degree of service reliability; greater output; less weight; less volume or smaller size, John B. Alfers, Navy Department, Bureau of Ships, told the society. He listed numerous items involving plastics in the electrical equipment on ships and revealed, "A quite successful development program has been conducted over the past year or so to obtain silicone resin glass fiber laminates. Laminates have been produced which we expect to operate continuously at 200 deg. C, which have very good arc resistance, good fire resistance, quite good loss factors, good moisture stability and otherwise satisfactory characteristics for shipboard use."

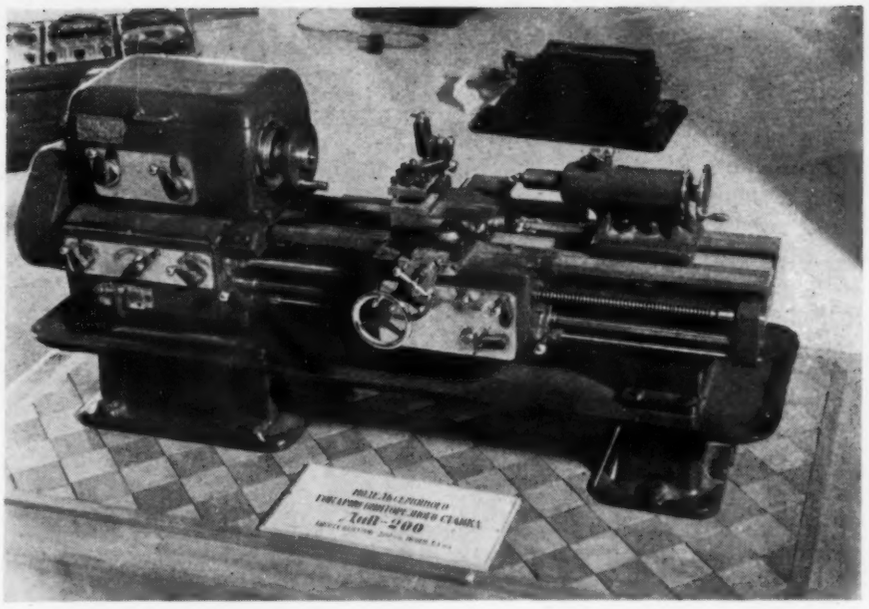
Range of Items Under Study for Phantom Orders

WASHINGTON—Machine tools are not the only items for which pool orders are being established. Studies are now under way on gages, abrasives, cutting tools, mechancial and hydraulic presses and hammers, materials handling equipment, industrial furnaces and ovens, foundry equipment and supplies, and several other special plant equipment categories.

Under the recently completed details of the government's system of placing "phantom" orders for essential goods to go into effect in the event of war, the National Security Resources Board has sent out a half dozen such orders to machine tool manufacturers through the facilities of the Reconstruction Finance Corp. Within the next four weeks it expects to issue the remainder of the 290 orders it has prepared for a total of 100,000 machine tools. Board experts estimate the orders represent between $750 million and $1 billion worth of tools.

These ghost contracts will be the model for similar notifications the NSRB's Director of Production George Felton plans to send to every other industry now making a standard product the government expects to need in the time of war.

The contracts will be effectuated by whatever agency Congress should create to handle wartime production. The products thus acquired will be placed in a pool and then parcelled out to the various federal military agencies.



***ENGINE LATHE** exhibited at a heavy industry exhibition in Russia recently*

The breakdown on procedure in setting up pool orders for machine tools, as given to the board by S. E. Reimel and E. R. Henning:

1. A survey is made of capacity, 40-hour basis, of machine tool plants deemed acceptable to produce. This has been done by NSRB.
2. Munitions Board is asked for a breakdown on 100,000 tools most needed by the military in any emergency, by types and sizes. This has been done.
3. NSRB statisticians take first two steps and draft tentative breakdown of orders for the bona fide plants, in this case 290 of them. Each plant is given a tentative schedule of production of specified machines, based on its ability to produce and its skill in turning out tools similar to those on the order. This already has been done.
4. With the tentative order set up, it is sent to the tool builder with the request that he comment on his ability to produce and his suggestions on what accessories should be included in the order for the particular tool. This is returned and adjusted according to manufacturers' comments. This is now being done.
5. Experts in the manufacture of each major category of tool—horizontal boring mills, turret lathes, planers, grinders, etc.—are called in from industry to check over tentative orders for each type of tool to each manufacturer. This man helps to determine if the right people are getting the orders for the right sizes of tools, helps standardize the orders so that best utilization is made of skill and ability to produce. This is now being done.
6. When the expert has okayed the orders being sent out on his specialty, and each order has been cleared by the necessary experts, it is in final form as a pool order or "schedule of production." Now being done.
7. In the event of an emergency the RFC would send out letters of intent based on individual pool order (which is numbered). Or it may be that special legislation may be drafted next year to allow letters of intent to be sent out by RFC before an emergency. All that is needed after the letter of intent is a telegram ordering the go ahead on that letter. Should a bomb drop, however, before the letters of intent are sent out, the manufacturers would know enough to go ahead on the order without waiting.

Plant Procedure on Phantom Order

WASHINGTON—Here is what a manufacturer should do when he receives a phantom order:

1. Call in his shop experts and determine whether he would be able to fill the order with present labor and capacity.
2. Make a list of parts needed from other plants.
3. Query suppliers and sub-contractors on their supply situation and the length of time they would need to fill their portion of the phantom order.
4. Notify the NSRB's office of production if he can not carry out the contract.
5. Go through the first four steps again if he receives a substitute schedule from the board.
6. Inform the office of production of any substantial changes in capacity at any time which would affect execution of the order.

This is as far as the manufacturers' duties go in connection with the ghost contracts in peacetime. They impose no legal obligations upon the producers, the NSRB or the United States government.

There is no secrecy involved in the specific orders. A manufacturer may say what his is, if he is so inclined. NSRB officials say they are not going to disclose individual orders, however, because some companies may not want to tell that much about their business.

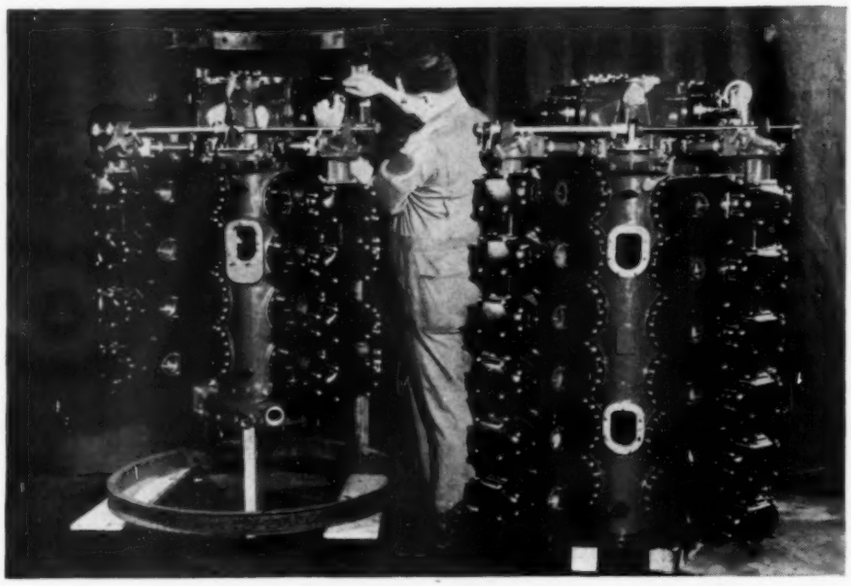
Detroit

WILLY'S OUTLINES PRODUCTION EXPANSION . . . HEAVY TOOLING SEEN . . . OTHER MAKERS PLAN 1949 SHOWINGS

Throwing open its shops on the third annual Institutional Day, Willys-Overland Motors, Inc., outlined future plans which carry with them the promise of chassis and body tooling.

Probably the most significant requirements ahead are for Willys 2 and 4-door sedans, which will be offered with a choice of 4 or 6-cylinder engines. These bodies have been mocked up, but not immediate release on dies is in prospect. The reason is that the plant is fairly well occupied in producing Jeeps, Jeepsters, station wagons and commercial vehicles. Therefore, it will not take on production of passenger cars until steel supplies ease up, or until reduced demand for other jobs in its line make it possible to squeeze the cars into production planning.

Also on list for tooling as a 4-wheel drive to accommodate the 6-cylinder engine, in installations like the station wagon, panel delivery, utility wagon, station sedan, Jeepster and truck. More tooling is indicated for the day, not too far away, when the truck will be put into production with the 6-cylinder engine.



***EIGHT AND 12-CYLINDER** V-type models of Continental's new line of heavy duty air-cooled engines are shown above in a partly assembled condition which shows the simplicity of their basic design. The 8-cylinder engine develops 530 hp. and the 12-cylinder model 810 hp., with supercharger 685 and 1040 hp.*

Forge Facilities Great

In addition to manufacturing its own requirements, Willys is doing a constantly enlarging job as a supplier of forgings and castings. Its forge shop in Toledo — a well-equipped facility with capacity for some 80 million pounds of forgings per year—is now operating at about 45% capacity, more than half of which is on contract work. Its Wilson foundry subsidiary, Pontiac, Mich., is working at capacity; 60% of this is on work for outside concerns.

Although the 1949 model market was officially opened last summer when Ford announced its restyled cars, the actual start of the 1949 calendar year merchandising drive is now close at hand.

Kaiser was the first maker to show 1949 models during the latter portion of the year. The new Kaisers have been revamped most modestly —but subtly enough that considerable of a "new look" has been achieved. Lowering of the body has given a considerably different effect to the appearance of the car, removing what some onlookers felt was a "boxy" effect.

Nash Shows Oct. 22

Nash will show Oct. 22 a drastically restyled line of cars. The new models of the Wisconsin member of the passenger car industry fall into the accepted postwar mode—sweeping pontoon sides which have swallowed up areas formerly occupied by fenders, lowered roofline, and the like. A few mechanical changes of note are included in the engine accessories, aimed at improving gasoline mileage.

Frazer will be shown before many weeks have passed; it, like the Kaiser, has been markedly improved by lowering. For the first time since Kaiser Frazer was set up, there will be models available beyond the 4-door sedan—a hard top job that looks like a convertible, and, perhaps a little later, a convertible itself.

Other independents plan little more than identification changes. Hudson, Packard, and Studebaker fall into this category.

Cadillac First of GM

Cadillac will likely be the first of the General Motors family to display its 1949 wares; this showing will come well before the end of the year. Cadillac's design changes will be on the minor side; the postwar styling it developed in the 1948's, shown first last spring, will be modified only slightly. Far more important is the fact that the new Cadillacs will be powered by a new, higher compression engine, along the lines of the Kettering powerplant unveiled by Olds recently.

Incidentally, Olds is being given credit in auto circles for stealing a march on its sister G. M. division. It was common knowledge that both Olds and Cadillac would come out with the same type of engine, but Olds announced first and gained the benefit of a broad wave of publicity.

In any event, Olds, Buick and Pontiac will be introducing around the turn of the year, with Chevrolet coming soon after.

The Ford group, which includes Mercury and Lincoln, will likely put through minor identification changes for 1949 selling, but no more. The Ford designs are fairly well frozen until 1950, at earliest. By that time, it should be noted, automatic transmissions will likely be seen through at least the upper two-thirds of the line.

Chrysler Holding Off

Chrysler Corp. will announce 1949 models for its Chrysler, DeSoto, Dodge, and Plymouth divisions well after the first of the year—perhaps February or March.

Production of cars and trucks, meanwhile, continues at a stabilized rate around 120,000 units per week. With labor troubles in the background, with the big producers momentarily (but only momentarily) freed of steel shortages, and with no changeover shutdowns of consequence immediately at hand, this rate may be held for a month.

Final Allocation of $96 Million For 313 Air Force Planes Listed

WASHINGTON — Last remaining dollars in the U. S. Air Force fiscal 1949 kitty for new plane purchases has been earmarked for airframe manufacturers. This virtually concludes the prime contracting phases of the USAF fiscal 1949 procurement program in which $1,544,000,000 will be spent for 2727 new military aircraft.

Final USAF allocation totaled $96-million for 313 planes as follows:

Boeing Airplane Co., Seattle and Wichita, will get a $40-million contract to begin production of its six-jet, sweptwing Stratojet Bomber Bomber (B-47) at its Wichita No. 2 plant. Initial contract will be for 10 of the better than 650 mph. bombers. Boeing expects to boost Wichita employment from 6,000 to 15,000 workers by early in 1950 to handle B-47 production.

Northrop Aircraft, Inc., Hawthorne, Calif., has been picked for a substantial increase in its last year's order for 10 trimotor Raiders (C-125). The Raider comes in three versions: an assault transport equipped for rough-field operations; an arctic rescue plane with ski-landing gear; and a standard cargo transport.

Cessna Aircraft Co., Wichita, will come into the USAF post-war procurement program for the first time with a large order for its Model 195, 300 hp. four-seater executive transport. This will be an off-the-shelf purchase of stock commercial models for the Army Field Forces' use as a liaison plane.

Sikorsky, Division United Aircraft Corp., East Hartford, Conn., will get an order for more H5G Helicopters. This is a four-place copter used primarily for rescue work.

Kellett Corp.'s XH-10, twin engine, 10-passenger helicopter will go into production under the final USAF allocation. Kellett Corp., North Wales, Pa., built the experimental model which successfully passed its flight tests. But due to reorganization of Kellett under federal bankruptcy law it has not yet been determined who will get the H-10 production contract. Howard Hughes Aircraft Co., Fairchild Airplane & Engine Co., and part of the Kellett management are battling for the H-10 contract.

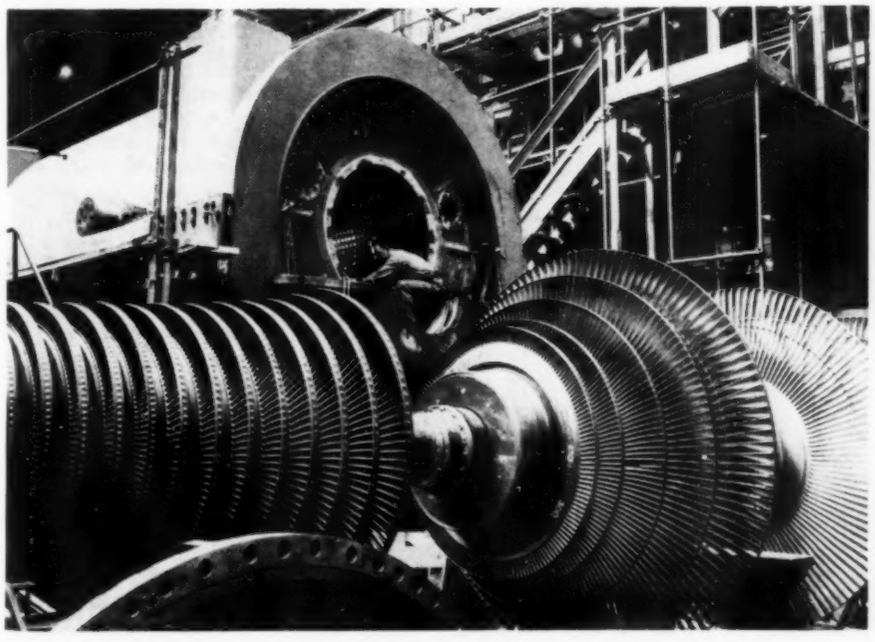
Between $30-million and $40-million of the $96-million fund has been earmarked to buy a new twin-engine training plane to be designated the T-29. Glenn L. Martin Co., Baltimore, and Consolidated-Vultee, San Diego, have been battling bitterly for this contract with modifications of their commercial transports. USAF has not yet decided whether it will buy the Convairliner or the Martin 2-0-2.

Increased guided-missile production will account for another $16-million.

Defense Secretary Forrestal's approval of the $86-million fund last week gave the USAF all of the 2727 planes originally voted by Congress for fiscal 1949 procurement. Routine approval by the President is required before actual contracts can be let on the final $96-million. Recently (last week) Truman approved release of $103-million previously passed by Forrestal and no trouble was expected in the White House over the final fund.

USAF still has about $348-million to spend on production-tooling equipment for high-volume production of specific planes. Some of this money will go for preliminary production work on planes that will not go into production until fiscal 1950 money is available.

Navy still has about $100-million of its fiscal 1949 aircraft procurement funds unallocated. Final decision of where that money goes will be made early in October with present plans calling for the bulk of it to be spent for Lockheed patrol planes.



TURBINE-GENERATOR *of 100,000 kw. is shown being assembled for test in General Electric's Schenectady, N. Y., turbine plant. Tip speed of the last-stage wheels of the 35-ft.-long, 70,000-pound, 23-stage turbine rotor in foreground is about 1,390 fps., well above the speed of sound*

Tom J. Smith, Jr., Resigns PMI Post

MILWAUKEE—Tom J. Smith, Jr., president of the Pressed Metal Institute, has resigned, Woodward G. Jeschke, chairman of the PMI executive committee, has announced. Mr. Smith has served for the past four years.

Pending action of the board, Vice President Walter A. Gorrell, president of R. J. McAleer Co., Philadelphia, will direct activities of the stamping manufacturers' organization.

Play on Lighting Proves Forceful

NEW YORK—Adequate lighting in offices, stores, schools, factories, on streets, playgrounds and airports was forcefully brought home in a six-act play produced by the Lighting and Lamp Divisions, Westinghouse Electric Corp., at the Essex Hotel Oct. 4.

Professional actors are in the presentation, which is on a tour of 33 major cities from coast-to-coast. Dramaturgy, Inc., Cleveland, produced the show in cooperation with Westinghouse scientists and many unique and striking lighting effects have been devised. The narrator is the veteran actor, Noel Leslie, who begins the show with an explanation and visual presentation of the sun's spectrum—source of all natural light and color.

Employers Must Talk with Unions On Pension Plans

WASHINGTON—Employers with an eye on fourth-round, postwar contract negotiations got an important signal recently: if a union wants to, the boss must at least discuss a pension plan. And if there already is a pension plan, he must bargain with the union on any changes. That's true whether or not the pension is part of the union contract.

This milestone in collective bargaining was placed by the U. S. Circuit Court of Appeals at Chicago. By unanimous decision, the court held that Inland Steel Co. cannot refuse to discuss with the United Steelworkers of America, C.I.O., changes in a retirement plan instituted by the company at its Chichago Heights (Ill.) and Indiana Harbor (Ind.) plants in 1936 before advent of the union.

Incidentally, the court also reiterated a warning unions have heard from several other courts: Their officers must file non-Communist affidavits if the unions wish to use the services of NLRB; this Taft-Hartley rule is constitutional.

The decision will have far-reaching effect on labor relations for years to come, if it stands. Never since the beginning of the Wagner Act in 1935 has an employer been told that pensions or other employee benefits are "wages" subject to collective bargaining—until this year. This was largely because, until recently, unions considered pensions as paternalistic and want nothing to do with them. Now unions have become more social conscious, ask for all sorts of benefits affecting the worker's welfare.

This is borne out by a current survey of the Bureau of Labor Statistics showing that more than 3-million workers are covered, under a union contract, by some type of health, welfare or retirement benefit plan. It is estimated that more than that get the same benefits without a union or outside the union contract. Once a union gets in a plant, the employer's hands are tied as far as any changes in a benefit plan may be made.

Inland Steel is appealing to the Supreme Court for relief. Other management will turn to next year's Congress if the Supreme Court affirms the Chicago court's action. The Taft-Hartley law now regulates, to some extent, the administration of union welfare funds, including pensions. Possible changes in this part of the law is certain to get serious attention by the Senate-House watchdog committee in its report to Congress on March 1.

***SIR FRANK WHITTLE,** inventor of the jet propulsion gas turbine, examines a lightweight turbo-jet engine developed by the Boeing Airplane Co. while on a visit to the Seattle, Wash., plant. Dan Hage, chief of the propulsion unit, explains features of the 85-lb., 150-lb.-thrust engine*

English Speaking Countries Plan Unified System of Screw Threads

NEW YORK—Acceptance of the 60° thread angle by the British has set the stage for a unified system of screw threads in Canada, Great Britain and the United States. Lack of interchangeability of the USS thread of 60° thread angle and the Whitworth thread of 55° thread angle has been the source of much confusion, especially in military procurement during the two World Wars.

Threaded products supplied to the British Ministry of Supply by British and Canadian sources will be made to the new standard. As in past British practice, the roots and crests of the threads will be rounded. However, this difference from the USS thread form will not affect interchangeability.

A unified thread system will not cause American manufacturers to scrap existing threaded products, tools or gages. But there will be economic loss to the British and Canadian firms, especially those serving the government.

Formal agreement will probably be reached in November, almost 30 years since unification was first proposed. During the intervening years, meetings of experts have attempted to resolve the problem. Decision to accept the American 60° thread angle reflects the relative economic and manufacturing statuses of the countries involved at the present time. It would be much more costly for the Americans to compromise or to accept the British thread form.

Pitches in the American and British thread systems are alike except for 12-pitch in the Whitworth system and the 13-pitch in the USS system for the ½ in. thread. The new American standards will show the 12-pitch as an alternate. Actually the work of unification may be extended to other kinds of threads. Military expediency would appear to justify further agreements as soon as possible.

The American draft of the new standards was worked out by Sectional Committee on Standardization and Unification of Screw Threads B1, which was organized in 1921 under ASA procedure and sponsored jointly by the American Society of Mechanical Engineers and the Society of Automotive Engineers. Present chairman is E. J. Bryant of Greenfield Tap & Die Corp.

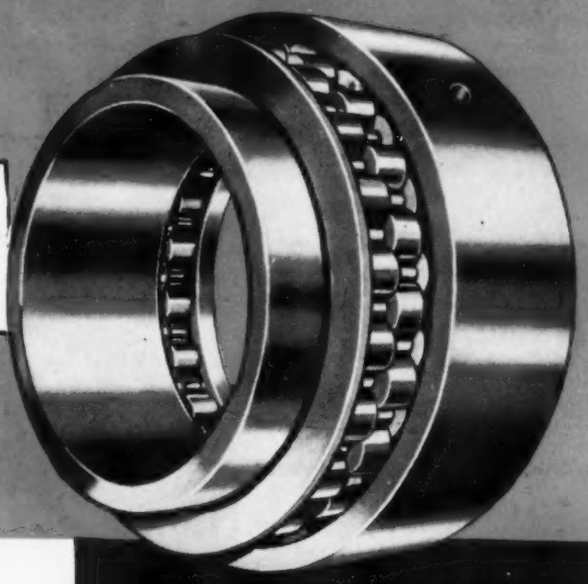
The new standard proposes to change the system of fits, presently known as Classes I to V, in accordance with modern manufacturing methods and requirements. Details have not yet been fully acted upon. When they have, *American Machinist* will carry a complete report on the new fits and the benefits expected of this important work.

An unusual Bearing for Severe Service!

GREATER LOAD CAPACITY
—does the work of larger size conventional bearings

SHORT ROLLERS
—minimize the tendency of long rollers to skew

PRECISION RUNNING
—even distribution of load assures smooth, quiet running.



ORANGE "STAGGERED" ROLLER BEARINGS

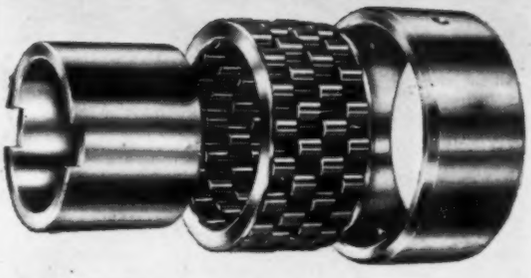
YOU have a real "designers' tool" in Orange "Staggered" Roller Bearings. With their higher load carrying capacity over conventional bearings, you can use smaller sizes to design more compactly and save space, weight and cost. Or, you can change to Orange "Staggered" Roller Bearings in present designs, same size, to gain additional load capacity, overload margin and longer service life. They are fully interchangeable with other solid race bearings. If you are faced with extreme precision requirements such as in lapping, grinding and other exacting equipment, Orange "Staggered" Roller Bearings meet the needs.

Whether you need one—or all—of these vital requirements in your equipment, you get them in the highest degree with the unique design of Orange "Staggered" Roller Bearings.

ORANGE

WRITE FOR ENGINEERING DATA BOOK
showing construction, range of sizes, capacities, tolerances, etc.

Orange "Staggered" Roller Bearings are standard in the heavy-duty crown sheave, sand line sheave and high speed counter shafts of the #42 Water Well Churn Drills made by the Sandersen Cyclone Drilling Co., Orrville, O. "Always satisfactory service from the bearings—and from the company", says this manufacturer.



Shown are end views of an Orange "Staggered" Roller Bearing (upper) and a conventional roller bearing. Note how staggered roller design provides a multiplicity of contact points within the loaded zone.

ORANGE ROLLER BEARING CO., INC.
554 Main Street, Orange, N. J.

AM

ORANGE ROLLER BEARING CO., INC.
ORANGE, NEW JERSEY

Please send me your Staggered Roller Bearing Data Book.

Name..... Title.....

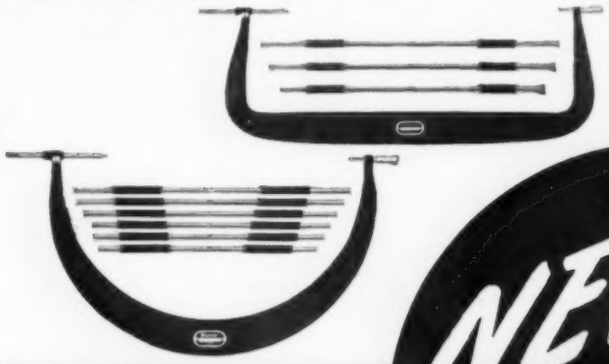
Company.....

Address.....

City..... State.....

TUBULAR MICROMETERS
"C" and "U" Types

Hollow frames combine lightest possible weight with extreme rigidity for greater accuracy, sensitive positioning and less fatigue in measuring dimensions up to 168" and more. Made with fixed, sliding or interchangeable anvils or dial indicator heads.



DIAL TEST INDICATOR
No. 645 — Heavy Duty

For severe applications around machinery or for continuous use in general tool work. Special spiral-type mechanism of unusually rugged construction for sensitive, accurate action. Dial reads 0-50-0 or can be furnished with 0-100 dial.

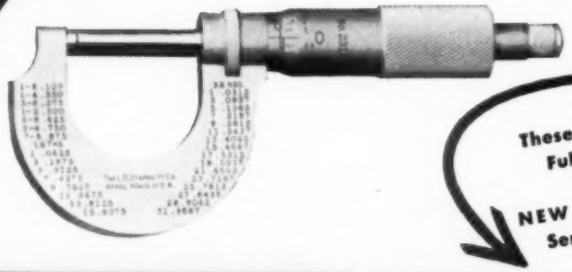
NEW TOOLS by Starrett

TOOL MAKER'S HAMMER
With Built-In Lens

A handy little hammer for spotting in layout work, light hammering, heading, etc. Built-in magnifier saves hunting and fumbling for glass. Offset head permits working in close quarters.

"SATIN CHROME" MICROMETERS

An important new feature now on *all* Starrett Micrometers. Non-reflecting *Satin Chrome Finish* eliminates glare, retards corrosion, increases speed and accuracy. Also: Hi-Micro (mirror-like) finish on anvil and spindle faces; threads hardened, stabilized and ground from the solid; decimal equivalents marked on the frame; simple adjustment for wear.



POCKET DIAL INDICATOR
No. 1010

An ideal precision-made gage for measuring paper, leather, sheet metal, wire, plastics, etc. Indispensable for inspectors, salesmen, buyers, stock clerks. Dial reads in thousandths, 0-.100", range 3/8" with "rev" counter. Chrome plated case, all parts stainless steel, non - breakable crystal. Decimal equivalents on back.

These And Many More Fully Described In STARRETT NEW TOOLS BOOKLET Send For Your Copy

STARRETT

MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS • DIAL INDICATORS • STEEL TAPES • HACKSAWS AND BAND SAWS • PRECISION GROUND FLAT STOCK

Buy Through Your Distributor

THE L. S. STARRETT COMPANY
Athol, Massachusetts

Please rush my free copy
STARRETT NEW TOOLS BOOKLET "C"

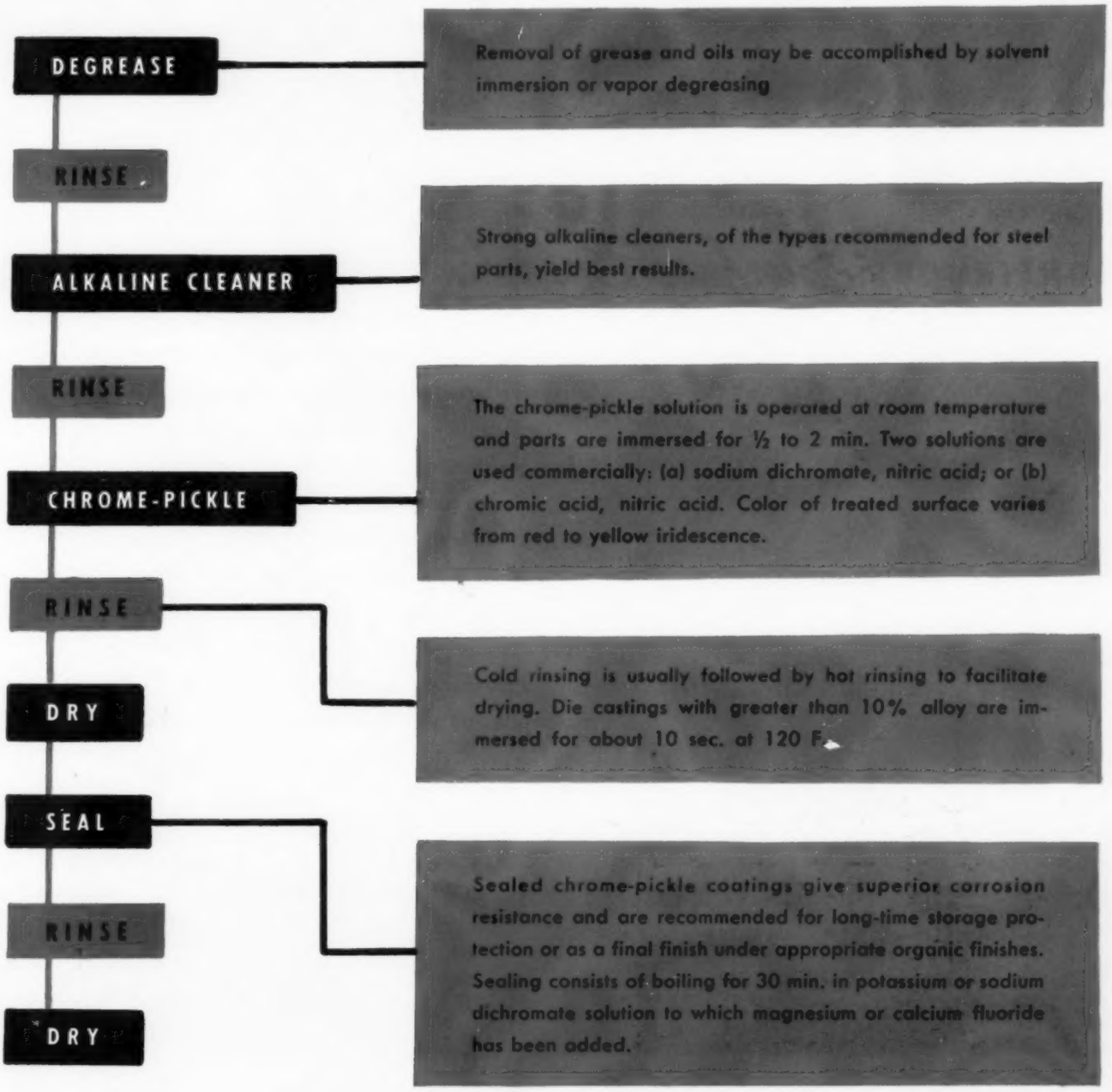
Name .....
Position .....
Company .....
Address .....
City ..... Zone ..... State .....

THE L. S. STARRETT CO. • *World's Greatest Toolmakers* • **ATHOL, MASSACHUSETTS, U.S.A.**

Process Sheet For Chrome-Pickle Treatment

BY GEORGE BLACK

THE chrome-pickle treatment is applied to magnesium stock to protect against tarnish and corrosion during handling and storage. As an appreciable amount of surface is removed during the treatment, it cannot be used for finished machined parts where close tolerances must be held. Treated surfaces form an excellent base for paint. Bronze, steel and cadmium-plated inserts are not affected by the treatment, but galvanized and brass inserts will be etched. For greater corrosion protection, the coating may be sealed as indicated below. It is suitable for all alloys of magnesium except those high in manganese.


DEGREASE
Removal of grease and oils may be accomplished by solvent immersion or vapor degreasing
RINSE
ALKALINE CLEANER
Strong alkaline cleaners, of the types recommended for steel parts, yield best results.
RINSE
CHROME-PICKLE
The chrome-pickle solution is operated at room temperature and parts are immersed for ½ to 2 min. Two solutions are used commercially: (a) sodium dichromate, nitric acid; or (b) chromic acid, nitric acid. Color of treated surface varies from red to yellow iridescence.
RINSE
DRY
Cold rinsing is usually followed by hot rinsing to facilitate drying. Die castings with greater than 10% alloy are immersed for about 10 sec. at 120 F.
SEAL
RINSE
DRY
Sealed chrome-pickle coatings give superior corrosion resistance and are recommended for long-time storage protection or as a final finish under appropriate organic finishes. Sealing consists of boiling for 30 min. in potassium or sodium dichromate solution to which magnesium or calcium fluoride has been added.

CONTINUOUS *Surface Broaching* FOR PEAK PRODUCTION

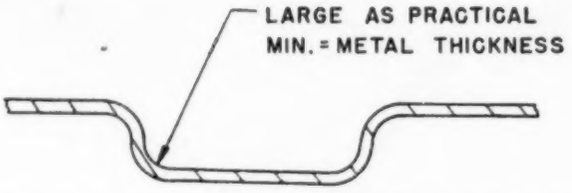
● Cutting the cost per piece through surface broaching provides the only available means left to produce some machined parts at a profit. In a great many cases surface broaching has shown remarkable savings in production time per piece as well as tooling maintenance costs when compared to conventional methods previously used. We will be glad to figure with you the advisability of using Footburt Surface Broaching Machines on your work. Just send blueprints and your hourly production required.

THE FOOTE-BURT COMPANY
CLEVELAND 8, OHIO
Detroit Office: General Motors Building

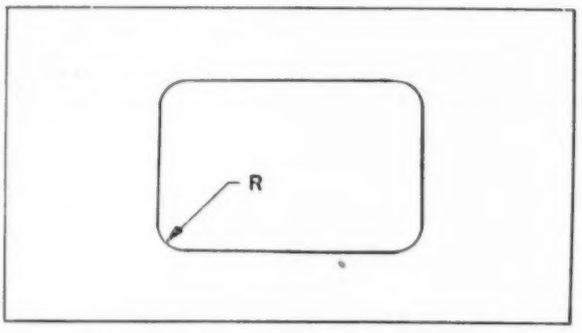
FOOTBURT *Surface Broaching*

FOOTBURT PATENTED TOOTH FORM

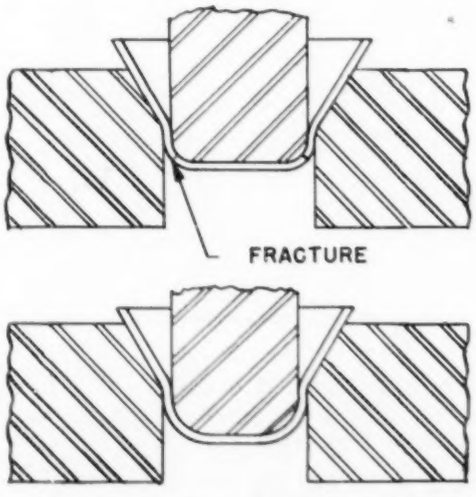
Stamping Data...IV



Inside radii on stampings at bends should not be less than the thickness of the metal, if possible. Larger radii facilitate production

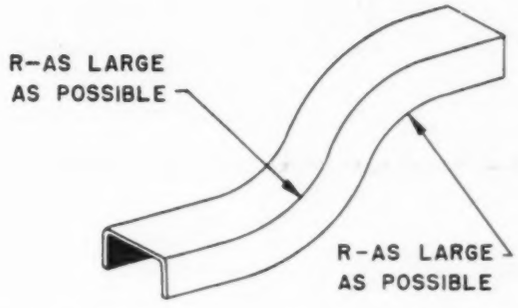


Corners of rectangular holes should have radii as large as possible



Radius at bottom of drawn stamping should be four times the metal thickness, because a smaller radius requires extra operations and dies. If a small radius is used, the metal is likely to fracture between punch and die

These practices are followed by automobile manufacturers and agricultural implement makers and are incorporated in their handbooks of engineering standards



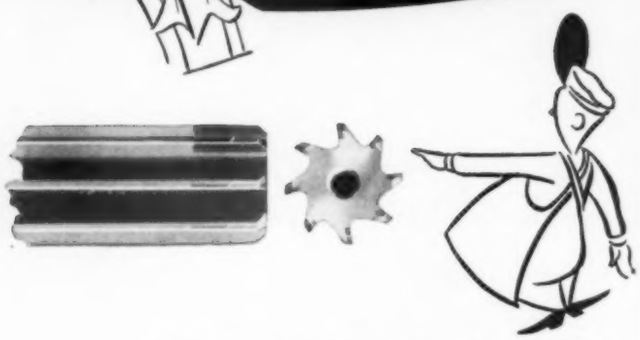
When a flanged piece is bent in the shape of an offset, both the inside and the outside radii should be as large as possible

Data given in "Stamping Data"—parts I to V—refer to operations on flat steel. This material should be specified on the drawing in decimal divisions of an inch, conforming to U.S. Standard Gage Numbers, up to and including 0.120 in. thickness. Fractions are used for material starting with 9/64 in. thickness. Examples of specification are:

0.060—SAE 1008 steel
0.060—SAE 1010 steel
9/64—SAE 1010 steel

Normally, SAE 1008 steel is used in the automotive industry for all parts requiring a deep-drawing operation and SAE 1010 steel for flat parts requiring only a simple bending or forming operation. Symbols CRS (cold rolled steel) and HRS (hot rolled steel) are used only when these characteristics are specifically desired, thus allowing the steel to be purchased most advantageously.

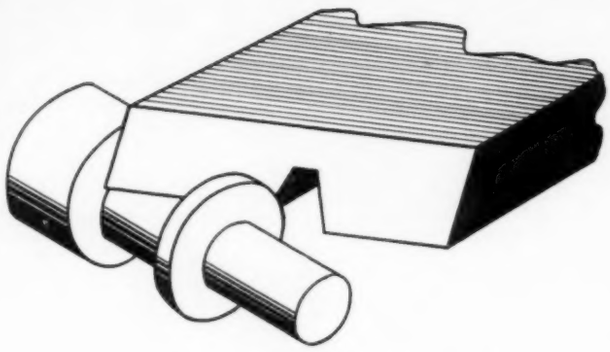
Helpful Hints for Machining ...by Stainless Sam



1

For reaming Stainless Steel, the best finish is usually obtained with a carbide tipped reamer, operating at a speed of 100 to 300 SFM. Stainless Sam recommends narrow lands and a secondary lead angle (see illustration).

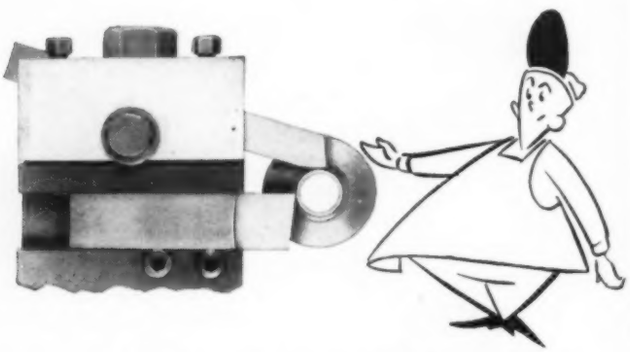
A smooth finish can be obtained with a high speed steel reamer at 15 to 40 SFM. The reaming operation should be flooded with sulfurized oil. Use water soluble oil for carbide tipped reamers operating at high cutting rates.



2

Skive tools may be used on Stainless for the production of close-tolerance, intricate shapes on single spindle automatics or turret lathes. A skive or sheer angle of 5° to 15° is employed; the cutting edge should be ground with a clearance angle of 1° to 2°, and a front rake angle of 10° to 15° (see figure).

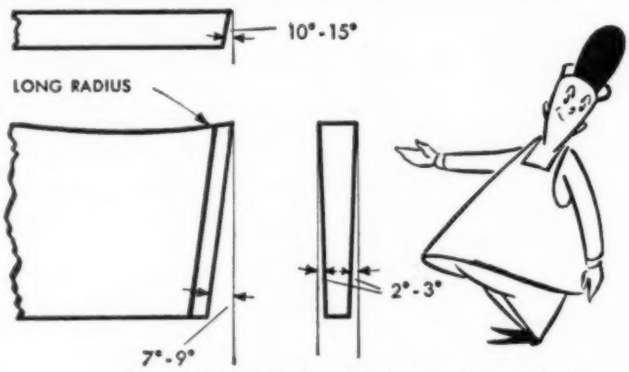
Because of the skive angle the tool may require a considerable amount of stroke. This may limit its application. In contrast, the shave tool (see No. 3) has a straight cutting edge, permitting a short stroke.



3

The shave tool is used for fine finish and close-tolerance work on multiple spindle equipment. Entire length of the cutting edge is in contact with the work piece during the cutting action. Cutting pressures are high, but it can be used with a short stroke.

Here "Stainless Sam" illustrates a combination shave and cut-off tool used on the back of the cross slide of a turret lathe. Made for a specific job it permits limited adjustment of the shave tool.



4

For cut-off operations on Stainless Steels, tools should be made of high-speed steel, one of the cobalt tool steels, cast alloys or carbides. If a high finish is required, a secondary operation with facing tool or grinding is recommended.

A cutting angle of 10° to 15° facilitates chip removal and is suitable for small work. On larger parts this angle can be reduced to 5°. Clearance is provided by the 2° to 3° angle indicated. A front-rake angle of 7° to 9° is recommended.

If you are not using ARMCO Stainless Steel bars or wire, perhaps parts of your equipment or products could benefit by these rustless metals—often at little or *no increase in finished-part cost*. ARMCO Stainless resists heat and corrosion, adds strength and beauty to the products you make.

For complete up-to-the-minute shop information, write for a copy of the ARMCO booklet, "Machining of ARMCO Stainless Steels."

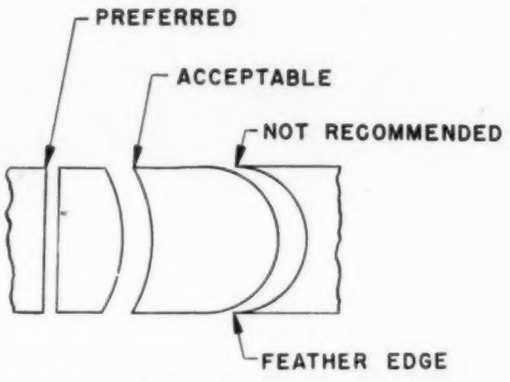
And remember, ARMCO Stainless bars, wire and angles are available for quick delivery. Just write Armco Steel Corporation, 492 Curtis Street, Middletown, Ohio.

Export: The Armco International Corporation

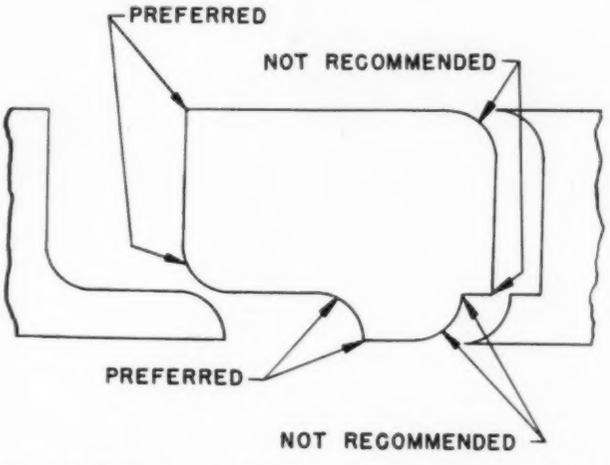
ARMCO STAINLESS STEELS

ARMCO

Stamping Data...V

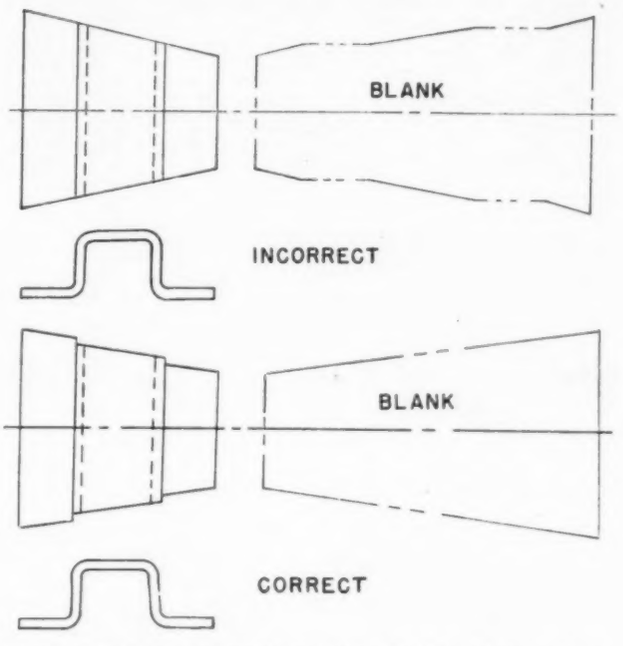


Feather edges should be avoided in shearing strip stock

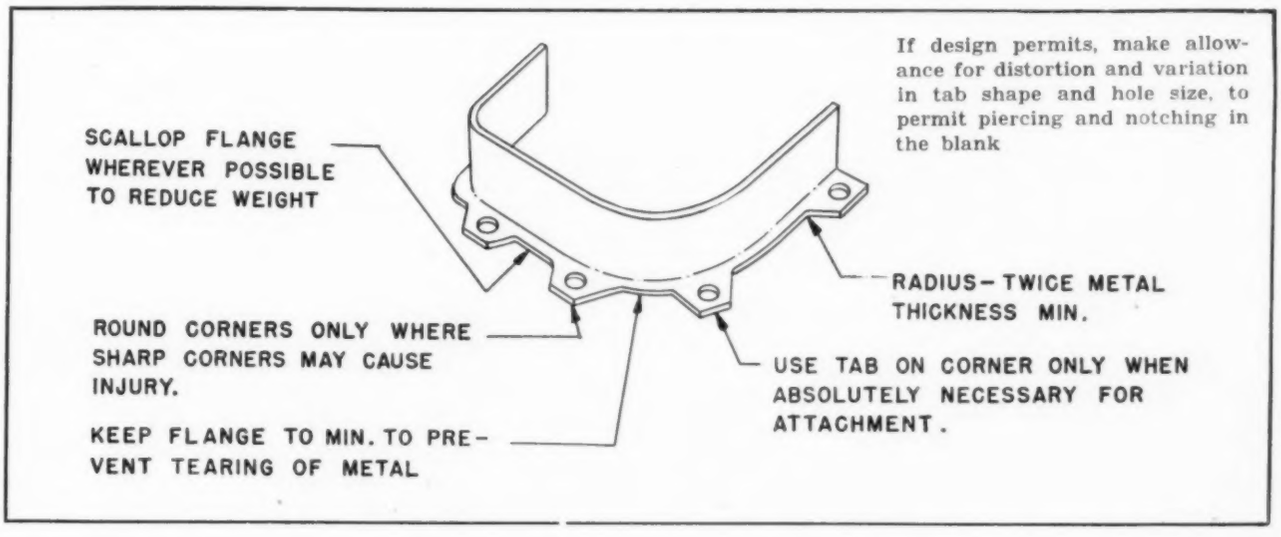


When designing parts to be cut from strip stock, make corners along the edge of the strip *sharp* and those not adjacent to the edge *round*, whenever possible

These practices are followed by automobile manufacturers and agricultural implement makers and are incorporated in their handbooks of engineering standards



Parts should be designed so that straight edges can be maintained on flat blanks for formed parts. This permits the blank to be sheared from flat stock and eliminates expensive blanking dies

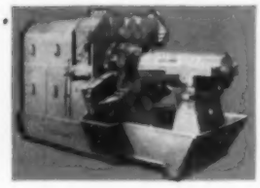

SCALLOP FLANGE WHEREVER POSSIBLE TO REDUCE WEIGHT
ROUND CORNERS ONLY WHERE SHARP CORNERS MAY CAUSE INJURY.
KEEP FLANGE TO MIN. TO PREVENT TEARING OF METAL
RADIUS – TWICE METAL THICKNESS MIN.
USE TAB ON CORNER ONLY WHEN ABSOLUTELY NECESSARY FOR ATTACHMENT.

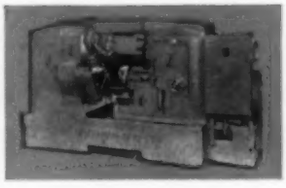
If design permits, make allowance for distortion and variation in tab shape and hole size, to permit piercing and notching in the blank

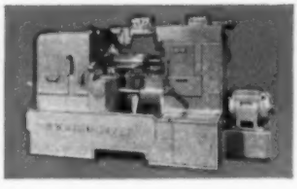
Where business is busiest...

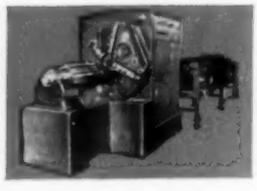
Where cost reduction history is made....

Look for New Britain Automatics









Visitors to the modern New Britain plant often remark that we seem to leave no step untaken to make the finest machines it is possible to turn out. This is perfectly true. New Britain automatics are not built down to a price, but up to a high standard in the belief that the least expensive machine actually is the one that will turn out the most pieces per dollar for the longest time.

In our 800,000 square feet of modern manufacturing space are many advanced production machines and techniques at work in the manufacture of the 25 different New Britain models. Here our engineers and those of other leading American concerns are teaming up to produce better, lower cost machining for the future. Yet you will find skilled "old timers" painstakingly hand scraping ways and topflight assembly men testing and running-in each machine before tooling. Practical tooling is applied by engineers of long experience in making metal cutting a cost cutting operation.

You'll find the same spirit at work when your New Britain automatics are set up and running on your floor. We consider no transaction complete until the customer has the maximum accuracy and production of which his New Britain automatics are capable.

THE NEW BRITAIN MACHINE CO.
NB

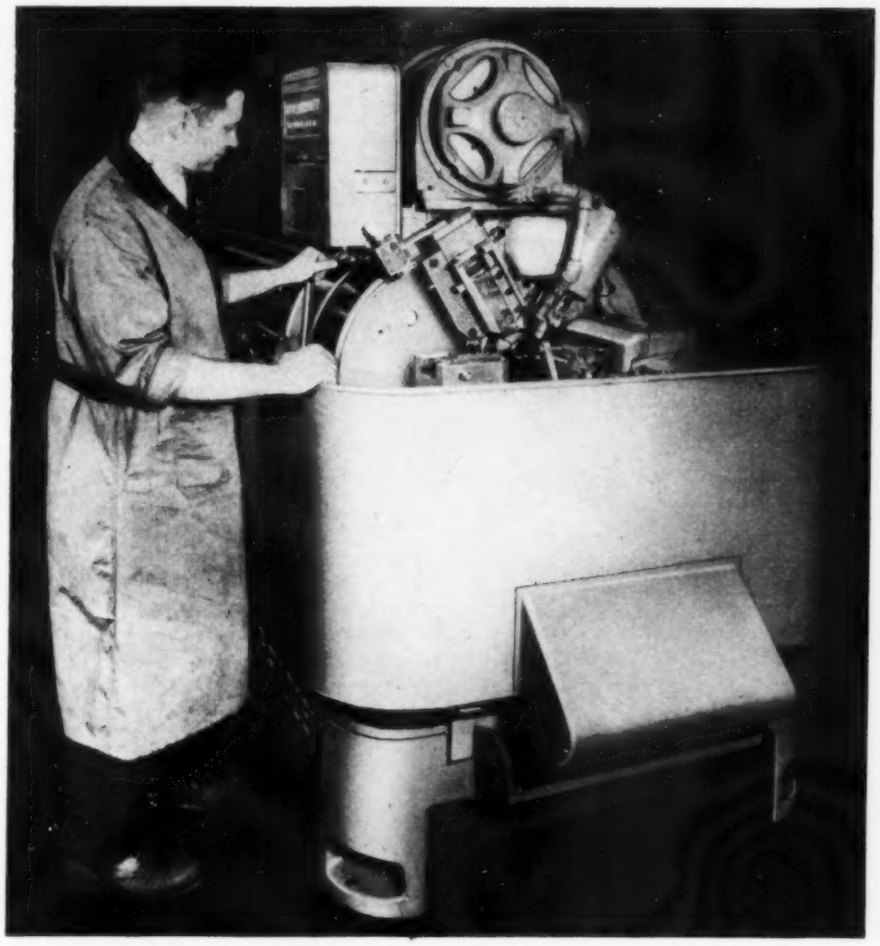
NEW BRITAIN
Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

Would you like to see some examples of how New Britains pay off on the job? Send for the New Britain portfolio of "Cost Histories" which gets right down to cases on specific jobs. No charge, no obligation, of course.

1048181

Shop Equipment News

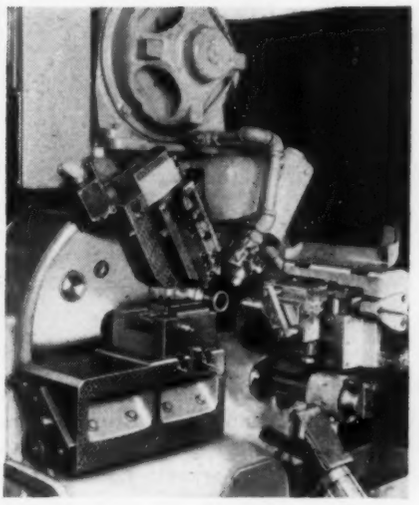


Acme-Gridley single-spindle automatic has a 1⅞-in. maximum travel for the cut-off slide

Single-Spindle Automatic Machine For Production of Parts from Tubing

The National Acme Co., 170 E. 131st St., Cleveland 8, Ohio, offers the SST single-spindle automatic for the manufacture of parts from tubing. The three sizes available are 2, 3, and 6 in. The machine is particularly suited to exceptionally fast and accurate output on parts made from tubing having relatively few operations. It is designed especially for making parts from tubing where simple operations such as turning, forming, straight or taper boring and cut-off are required in mass quantities. It is suited to the application of high speed or carbide tipped tools for high precision tolerances.

By changing sheaves, spindle speeds range from direct with 1800-rpm. motor down to 900; with 1200 rpm. motor, down to 600. The SST model has no stock-feed tube, stock being fed by cable, spring and pusher bar which are always under tension so that the stock is fed the instant the collet opens.



Heavy work spindle is supported in a double anti-friction bearing which is located at each end

In the 6-in. machine maximum length of stock handled is 12 in. A new type stock tube in half sections is featured. The upper half of the tube is swung upward manually, allowing the stock to be rolled into lower section, after which the upper section is manually closed and automatically locked.

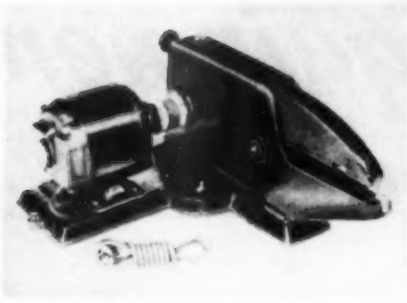
By providing a supply table with top at 5 or 6° angle, enough stock for one day's run can be kept in readiness for uninterrupted production. Standard length boring and turning is 1½ in. Maximum travel of boring and turning slide is 4 in. Maximum travel of forming slides is 1½ in. These dimensions are applicable to both the 2- and 3-in. models. Standard equipment furnished with the machine includes a standard stock-feed mechanism, a plain forming toolholder, a turning toolholder and a cut-off toolholder.

The 2- and 3-in. capacity machines are equipped with a stock-feed mechanism for lengths to 16 ft. Mechanisms consist of a switch-controlled reversing motor-driven gear unit in connection with a cable and spring which return stock pusher bar to original position.

CAR-WHEEL BORER is made by Consolidated Machine Tool Corp., Rochester, N. Y. The high-speed Betts hydraulic-feed car-wheel boring and hub-facing machine has push buttons and control levers conveniently grouped. An automatic table brake in conjunction with the automatic feed and traverse cycle is offered. Table stops automatically before spindle starts its upward travel to prevent scoring of work. Capacity is 17- to 48-in. cast-iron or steel wheels using a 5-jaw automatic self-centering chuck. Machine can be equipped with one or two electric or pneumatic hoists

Flexible Templet for Layout Duplicates Full-Size Curves

A new flexible templet for layout work is manufactured by Flexible Template Co., Camden, N. J. Available in lengths of 1-ft. intervals, the templet consists of a spring-steel flexible arm and thumb screw-clamp locating bars. Price is $3.75 per ft.

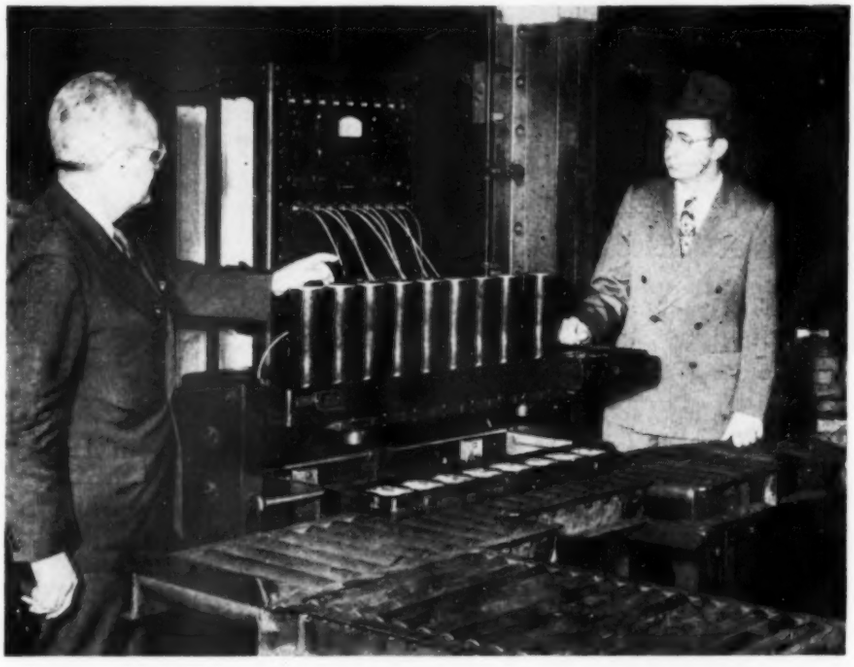


Small-Head High-Speed Shear By Federal, Cuts Inside Work

A high-speed shear called the "Grampus," designed with a small head and base to permit wide variation in work shape, is offered by Federal Machinery Co., 134 Grand St., New York, N. Y. Odd shaped material can be placed over the head or under the base for burr-free cutting.

The Grampus can be used for fast inside cutting, both straight and contour, by means of a locking device. No starting hole is required for inside work. The machine is rated up to and including 14-gage mild steel.

Finger-tip control of the stroke and rapid adjustment of the cutting blades for very light material are featured. It handles pipe work, and similar materials of various diameters and depths within the limits of its 7-in. throat. The machine weighs 100 lb. including its ¼-hp. motor. A direct coupling drive is used eliminating all belts.



Cylinder-Head Volume Capacities Are Measured by Sonic Vibrations

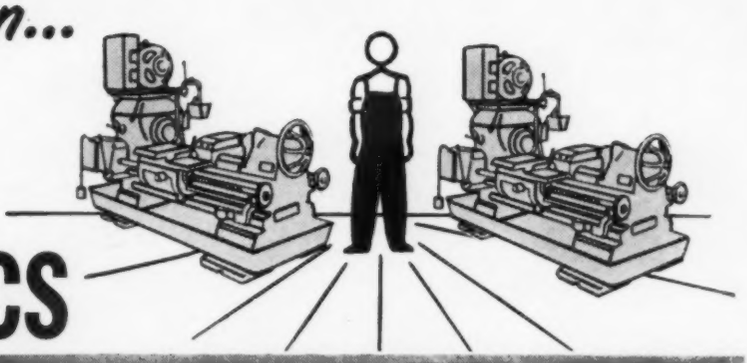
Sonic vibrations too faint for the human ear to measure are being used to measure the volume capacities of high-compression cylinder heads for the 1948 Futuramic Series 98 engine for the Oldsmobile Div., General Motors Corp., Lansing, Mich. Called a Cavitometer, the machine is made by Poole Manufacturing Engineers, Dallas, Texas, and is being used on a production basis for 100% inspection of cylinder-head cavities.

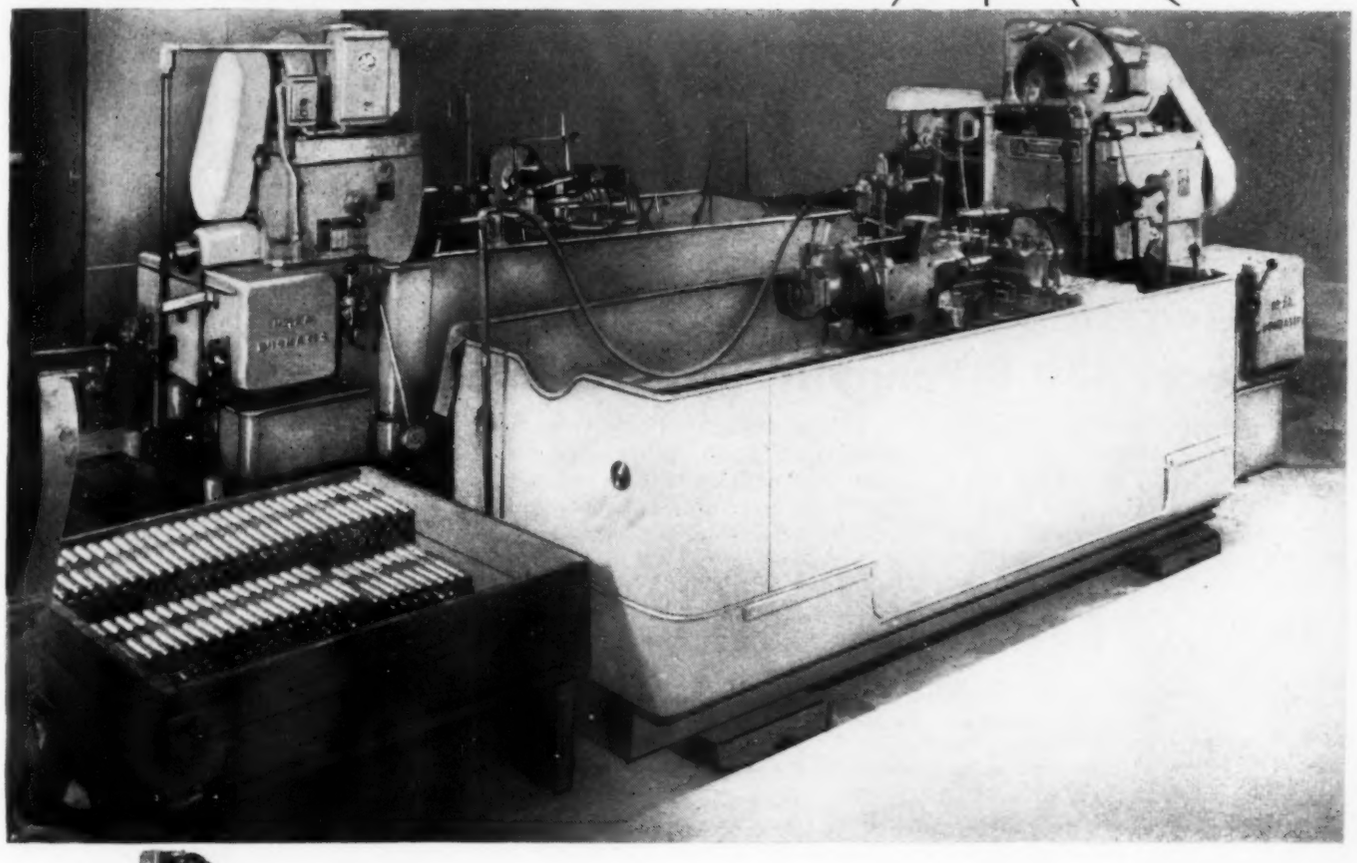
The machine is said to be capable of inspecting cylinder heads at the rate of 150 per hr. for eight-cylinder Oldsmobile engines. It will register differences in volume capacities with the accuracy of one part in 1500. The sensitivity to volume change in the cavities is said to be one part in 50,000.

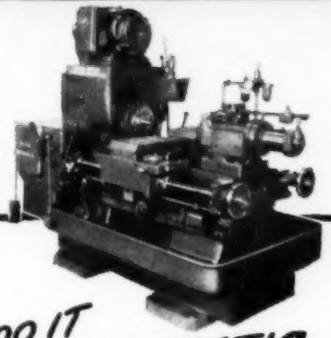
The cavitometer works on the principle that all cavities with a certain type of throat opening have a natural frequency at which they will resonate. The motor-lock head is placed in the machine and reflects a sonic wave that is compared with a master cylinder-head cavity of known frequency. The variation between these is interpreted in volume measurement and is indicated on a dial. Cylinder-head cavities are measured automatically in sequence.

75% Greater Production...

ONE-MAN OPERATES TWO DUOMATICS







DO IT with a DUOMATIC

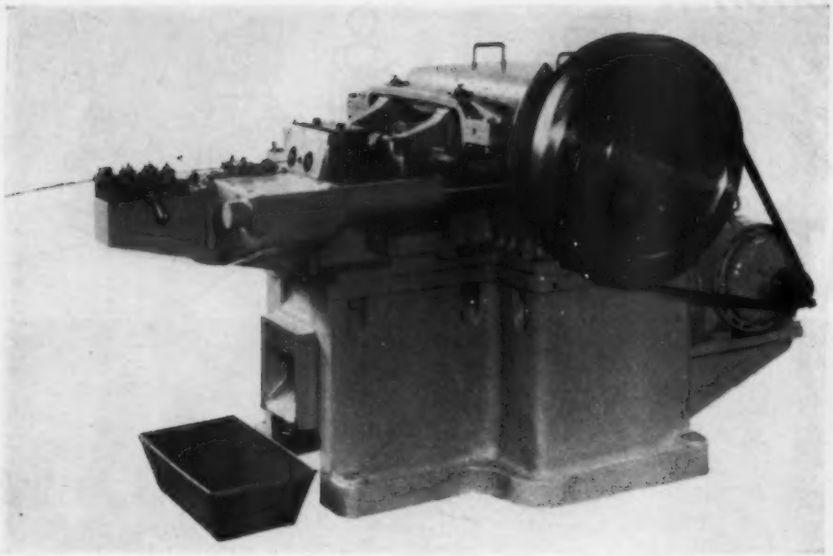
Truly automatic, the Duomatics are really two lathes in one. Two tool carriages operate singly or simultaneously to perform intricate turning and facing operations. And there are no expensive, time-consuming cams to change. Jobs are set up and run in a minimum of time.

The J. I. Case Company, famed farm equipment manufacturers, cites a specific production run of several jobs performed on its Lodge & Shipley Duomatic Lathes to prove this statement. In producing 1⅛" diameter snapping roll shafts for Case's famous corn picker, two Duomatics are used. Operated by one man, these automatic lathes turn and face cold rolled bar stock to ".002" tolerance" at a production rate "75% greater" than former lathes!

Such records are commonplace with Lodge & Shipley's famous Duomatics . . . 2A or 3A models. Lodge & Shipley Engineers will gladly show you other case histories of 2-A Duomatics (for smaller work) and 3-A Duomatics (for larger jobs). They will prove that Duomatics can do your repetitive jobs . . . far faster . . . with more profit.

THE **Lodge & Shipley** COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO



Black Industries Nail-Making Machine Produces 430 8-Penny Nails per min.

Black Industries, 1400 East 22nd St., Cleveland, Ohio, offers a nail-making machine capable of producing 430 8-penny nails per min. The machine is of all-steel construction and weighs 4500 lb. It is completely inclosed and operated under pressure lubrication. Main-shaft bearings are said to have 30,000 hour life because of pressure lubrication.

The circular cross head operates on a film of oil. Nine different models will be available to turn out the smallest brads to spikes. The machine has a delayed-feed action so that the gripper does not pinch until the vise is fully stopped. The length of feed covering the full range of sizes from ½ to 2¾ in. is adjustable while the machine is in operation. No. 10- to 14-gage wire can be used. It is operated by a 5-hp. motor through V-belts to a safety-shield flywheel. The machine is priced at $4500.

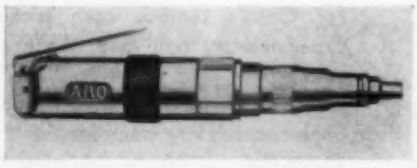
Slow speeds of 450 to 750 rpm. are particularly suited to self-tapping screws and cross-recessed head screws. Standard equipment with the tools include 8 ft. of ¼-in. hose and fittings, one finder and three bits as specified. A suspension bale is furnished on all lever models.

Short Series Holder by Eclipse For Standard Core-Drill Cutters

A short series holder for use with standard core-drill cutters is announced by the Eclipse Counterbore Co., Detroit, Mich. Four sizes are included. The smallest holder is 1¼ in. in diameter and takes Eclipse standard core-drill cutters from 1½ to 1 13/16 in. dia.

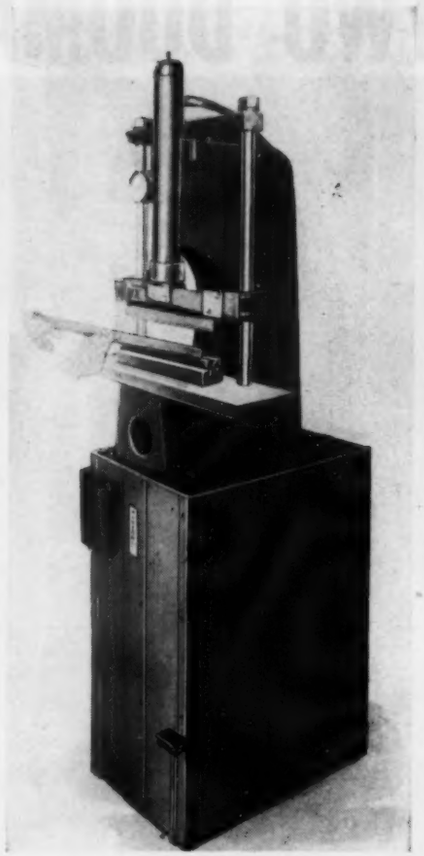
The next size is 1½ in. and accommodates cutters from 1⅞ in. to 2 3/16 in. The third size is 1¾ in. in diameter and accommodates cutters from 2¼ to 2 9/16 in., while the largest holder, 2 in. in diameter, takes cutters from 2⅝ to 3 in. inclusive.

The new holders which are designed for relatively shallow hole operations in turret lathes are being used for similar operations in drilling machines.



Aro Screwdrivers, Nut Setters Offer Low-Speed, High Torque

The Aro Equipment Corp., Bryan, Ohio, offers a line of low-speed high-torque air screwdrivers and nut setters. There are 12 models, No. 7060 to 7071 inclusive, in a range from 450 to 1100 rpm. Included are pistol-type and lever-type air tools with a choice of either positive clutch or friction clutch.



Munton Hydraulic Press Brake Is Available in Three Sizes

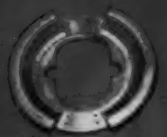
A hydraulic press brake which can handle 90° bends in mild steel, is introduced by The Munton Mfg. Co., 9400 W. Belmont Ave., Franklin Park, Ill. The 10-ton model handles 18-gage stock 3 ft. long, 14-gage stock 2 ft. long, and 10-gage stock 1 ft. long. The 20-ton unit handles 12-gage 3 ft. long, and the 30-ton, 10-gage 3 ft. long.

The 10-ton press brake with spring return is illustrated. It is used for forming only, unless the die sets have springs to brake punch and die. A dual-cylinder model, providing pressure down and up, is recommended for punching, broaching, pressing, and similar operations. A 9-in. throat is offered between the guide rods which are 20 in. apart, and 3-in. throat from guide rods out. The brake can be converted to a hydraulic press.

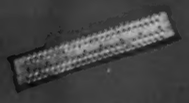
H-5 and H-6 High Speed Multi Drillers and Tappers

H-5 and H-6
Hand and Foot Feed

Available in Standard
or Heavy Duty Models
for work in small
or medium sized parts



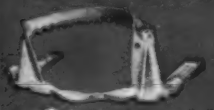
In Cast Iron



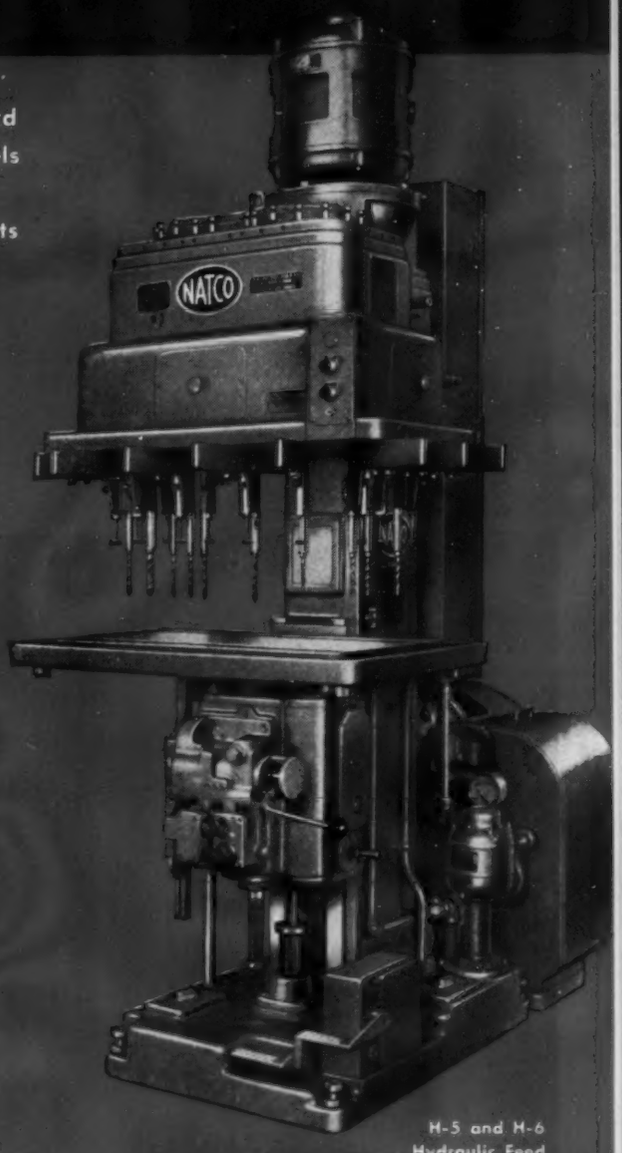
In Wood

In Steel

In Plastics



In Aluminum



H-5 and H-6
Hydraulic Feed

NATCO H-5 and H-6 Standard and Heavy Duty Multiple Spindle Drillers and Toppers make possible sensitive, high speed drilling and tapping in a wide range of materials at low cost. Features are the multiple spindle head, large working surface, quick change gears and speeds, vertical adjustment on spindles, and reversing motor drive. Available with hydraulic or hand and foot feed. Air operated rotary table available extra. Check details on these machines. Write for Bulletin 248.

***WRITE FOR ACTUAL PRODUCTION FIGURES ON THESE PARTS**

NATCO DRILLING, BORING, TAPPING
AND FACING MACHINES

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Ind., U. S. A.
Branch Offices: 1809 Engineering Bldg., Chicago • 409 New Center Bldg., Detroit • 1807 Elmwood Ave., Buffalo • 2902 Commerce Bldg., New York City

Call a Natco Field Engineer

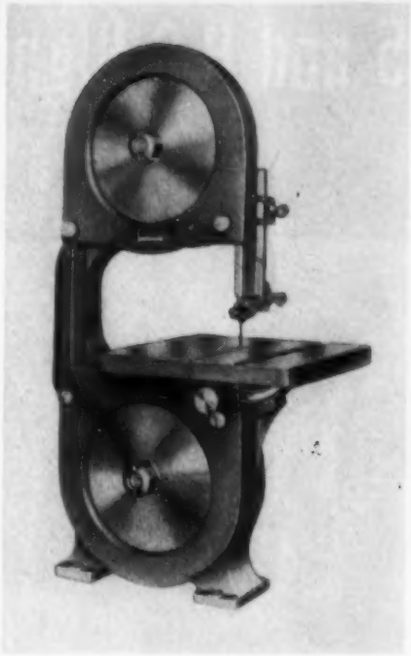
Portable-Type Cut-Off Machine Cuts Aluminum, Brass, Brick

The Model No. L1 cut-off machine is offered by Approved Devices Co., 525 Woodward Ave., Detroit 26, Mich. The machine will cut aluminum, brass, brick, rod, drills, ebonite, and many other materials. It is a portable, light-duty cut-off machine and will cut at any angle with a special attachment.

A screw handle is provided to feed the cut-off wheel steadily and smoothly for cutting heavy pieces. The machine is equipped with a 1/3-hp. motor, ac., 110 v., 60 cycles, single phase, cord and switch, and is listed at $69.75.

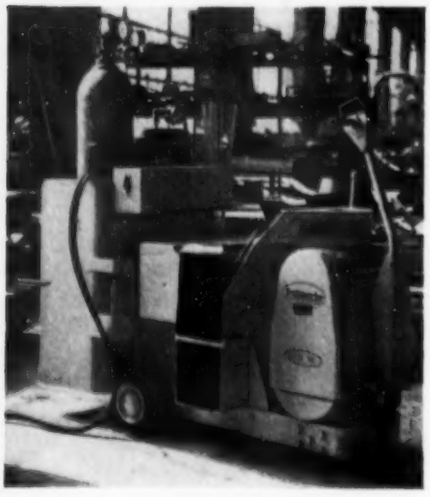
Airco No. 394 Electrode Holds At 100,000 psi. on Hard Steel

Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y., announces No. 394 electrode to operate on either ac. or dc., and to give welds of 100,000 psi. strength. It is suggested for fabrication of hardened steels which are susceptible to underbead cracking. The rod is a low hydrogen-type coated electrode.

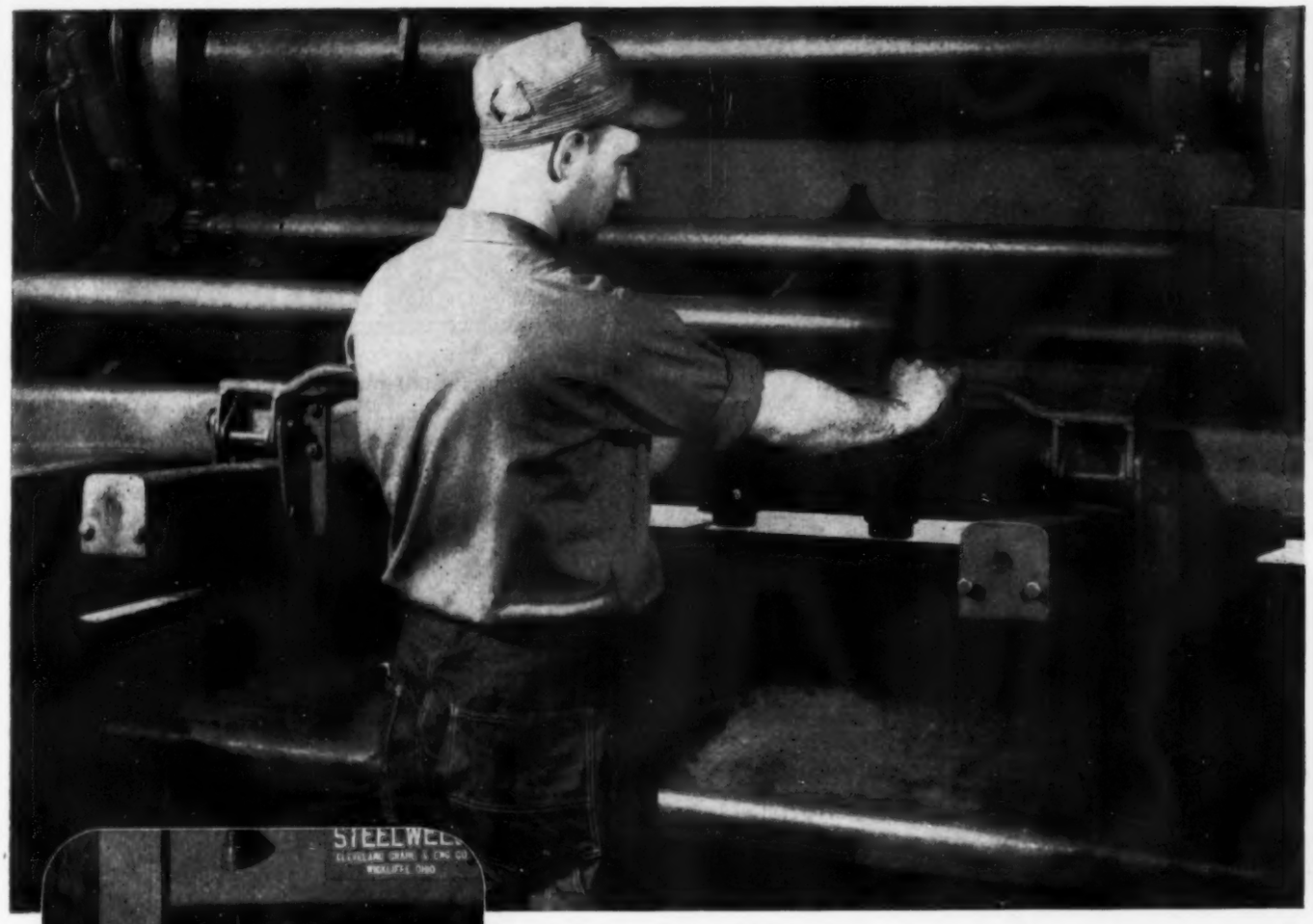


BANDSAW, made by Foster Manufacturing Company, 1 Kinsey Ave., Buffalo 17, N. Y., Has a 33½ in. overall height and has a tilt table 50° through zero to 45°. The 12-in. wheels are crowned with oil- and wear-resistant rubber tires. Shown is the Model H-4100 12-in. bandsaw. It weighs 47 lb. and is listed at $69.95 including the blades

SPECIAL MACHINE finishes parts, in clusters of four, cast in a single piece. Made by Cross Co., Detroit 7, Mich., the machine facilitates both finishing and handling. A total of 150 sets or 600 individual valve rocker-shaft brackets are drilled and reamed hourly by one operator. Ten holes are finished in each casting. The machine consists of a seven-station, power-operated index table. Feed is hydraulically controlled



ELECTRIC TRANSPORTER for carrying welding equipment is a battery-powered motorized hand truck. Called the Transwelder, the truck is made by the Automatic Transportation Co., 149 W. 87th St., Chicago, Ill. It consists of a Transporter chassis, and a rack mounted with tanks, rods, tools and essential equipment for acetylene welding. Space is provided for a fire extinguisher. The motorized truck pulls the electric welder



Steelweld Shears are packed with marvelous features that are not available in any other shears. Built in all sizes for thicknesses from 12 gauge to 1¼ inch

LIFT-UP TYPE BACK GAUGE DELIGHTS OPERATORS AND SPEEDS SHEARING

Shear operators acclaim this back gauge which can be raised up and out of the way to allow long sheets to pass through. They like its smooth easy operation when setting it for use.

The back gauge is typical of many features that make Steelweld Pivoted-Blade Shears so outstanding. It is put in or taken out of service simply by the movement of a horizontal bar. No bolts to turn. No parts to assemble.

It is convenient to adjust, too. The operating crank and dials are at the outside front corner of the shear where readily accessible, eliminating need of going around to back of machine. It is mounted on ball bearings and equipped with two dials for inch and also 64th inch readings.

The back gauge is standard equipment supplied with all Steelweld Shears. Lift-up feature is furnished only for ⅜" capacity machines and larger. Metal cut on lighter machines is usually pliant enough to pass under a gauge without lift-up arrangement.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

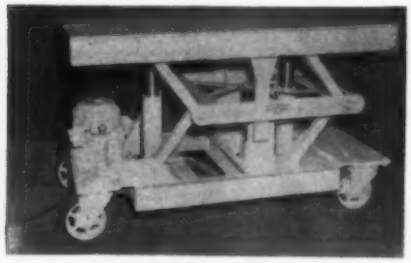
THE CLEVELAND CRANE & ENGINEERING CO.

1415 EAST 282ND ST. • WICKLIFFE, OHIO

STEELWELD PIVOTED BLADE SHEARS

Aero-Motive Self-Winding Reel For Suspending Portable Tools

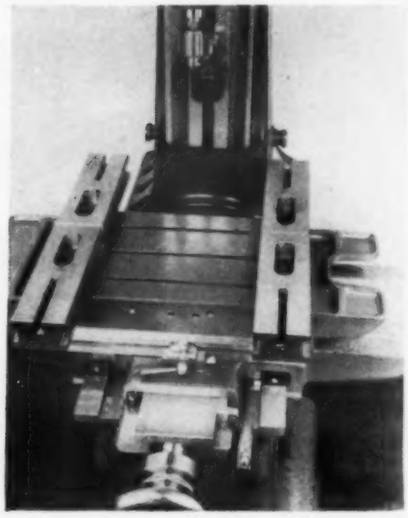
A self-winding reel that suspends portable tools for use on the production line and raises them out of the way when they are not needed, is offered by Aero-Motive Manufacturing Co., Kalamazoo, Mich. Called the Zoo self-winding balance reel, it can be hung from a beam or a cable in work position above the operator. The power tool is fastened to the end of a 6-ft. cable wound on a drum within the housing. Reel tension is regulated to balance any tool weighing up to 10 lb.



Lyon-Raymond Sheet-Feeding Table Features a 10,000-lb. Capacity

A 10,000-lb. capacity hydraulic elevating sheet-feeding table is offered by Lyon-Raymond Corp., 6144 Madison St., Greene, N. Y. Table has a 16-in. range of elevation. Known as the Model 66 table, the top is 36 in. wide by 66 in. long. Side extensions can be provided which will increase the width to 48 in. and end extensions are available for increasing the length to 96 in.

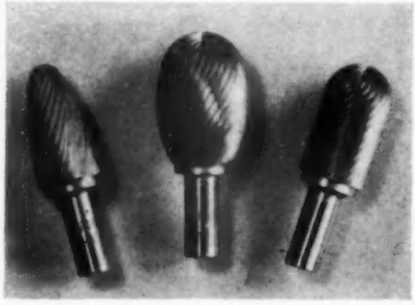
The table has a lowered height of 26 in. and an elevated height of 42 in. The table is portable. Two 8-in. swivel casters with Timken bearings provide steering. The two rear wheels are 10 in. in dia., and are equipped with ball bearings. Included as standard equipment is a two-speed foot pump with 5 ft. of hydraulic hose. A floor lock is also provided.



Extension Parallels for Borers, Grinders, Increase Table Size

Extension parallels for use with Moore jig borers and Moore jig grinders to increase effective table size have been offered by Moore Special Tool Co., Bridgeport, Conn. Offered in sets of four, they will accommodate work almost twice table size with no loss in accuracy of table settings.

With the parallels, the jig grinder and Models 1 and 2 Moore jig borers can accommodate work 5 in. larger than table size in both directions or 10 in. larger in one direction. T slots are provided for clamping dies in place. Dimensions are 2 x 3 x 10 in.

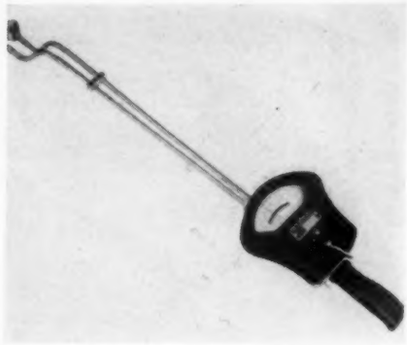


Large-Size Carbide Midget Mills Operate at 2000 to 5000 sfm.

Severance Tool Industries Inc., Saginaw, Mich., offers three large-size carbide midget mills. Operating at speeds of 2000 to 5000 sfm., the cutting action and controlability of the mill is greatly increased, being aided by the gyroscopic balance characteristic of the higher-speed power tools—either air or electric. The carbide mills will also cut hard materials up to 63-C Rockwell. They can be used in freehand operations where the tool is applied to the work manually or they can be chucked in machines and the work manipulated either manually or mechanically.

Behr-Manning Dry Grinding Belt Employs Special Resin Adhesives

A heat-resistant dry grinding belt is offered by Behr-Manning, Troy, N. Y. Called Resinall Metalite, the belt utilizes special heat-resistant, thermo-setting resin adhesives instead of the conventional glue-type adhesives. It is said to increase production in a ratio of 4 to 1 over the regular glue-bond material for high heat-generating operations. Belts are said to remain sharp longer.



Solder Tin-Content Indicator Is Portable, Direct Reading

A solder tin-content indicator is offered by Wheelco Instruments Co., 847 Harrison St., Chicago, Ill. The portable indicator checks for analysis of solder quality and provides a means of determining the ratio of the lead and tin content in solder. The direct-reading indicator consists of a high-resistance pyrometer and dual thermocouple extension.

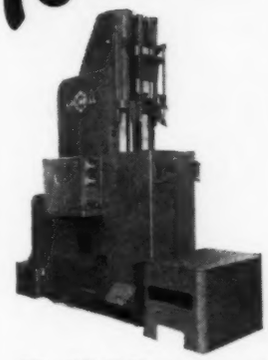
An Alnico magnet resistant to shock, heat, vibration and stray fields provides increased ruggedness without loss of sensitivity. The adjustable pistol-grip handle can be locked in horizontal or vertical position for ease of operation.

A 3 9/16 in. wide mirrored scale is calibrated in divisions representing the percentage of the tin content of the solder. The Model 2870 Wheelco solder tin-content indicator weighs 4½ lb. and is self-contained.

When it comes to broaching—

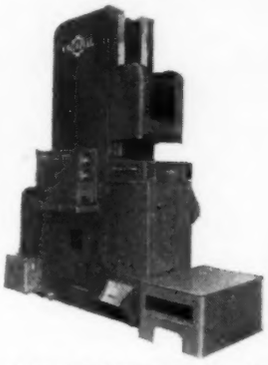
THESE NEW COLONIALS

will cut not only costs and time but "headaches" too



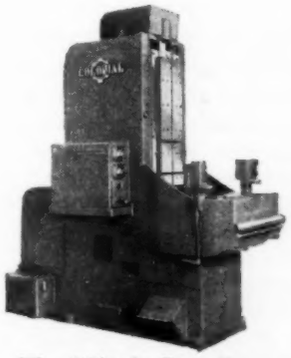
The "Pull-Downs" . . . outstanding for internal broaching of large parts.

Bulletin RD-48



The "Pull-Ups" . . . for fast internal broaching. Automatic unloading for small parts.

Bulletin RU-48



The "Single Rams" . . . there is nothing to equal them* for surface broaching.

Bulletin RS-48

**Except a Colonial "Dual Ram." For shorter runs, the Universal Horizontal is the machine for you.*

Here are some of the "inside" reasons:—

1.

All hydraulic units are grouped externally (cover removed). Valves are so made you can remove them without disturbing or draining the piping.

2.

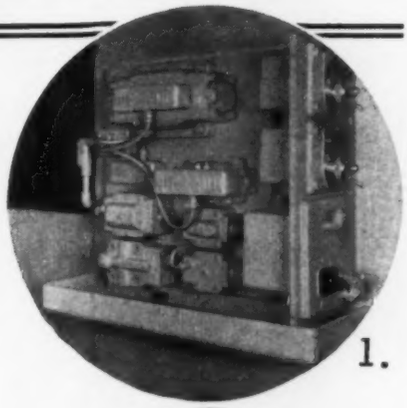
You won't have any trouble tracing circuits on this enclosed electrical panel.

3.

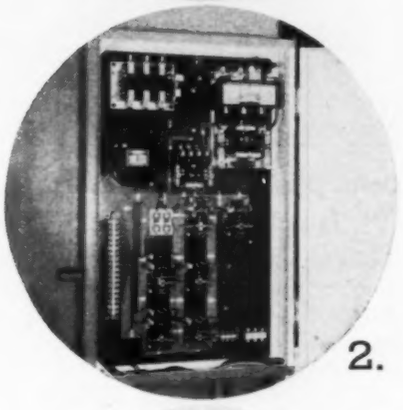
Scientific forced draft cooling of everything inside the machine is one of the reasons for the absence of service difficulties.

4.

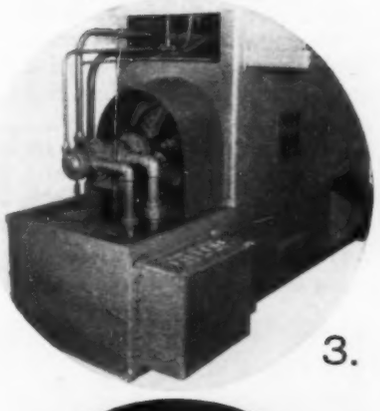
It's easy to keep the hydraulic system clean. You can remove, inspect and clean the filters without stopping the machine.



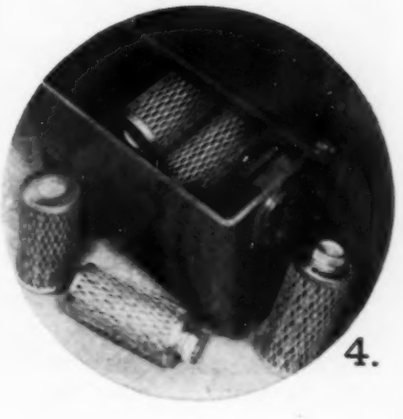
1.



2.



3.



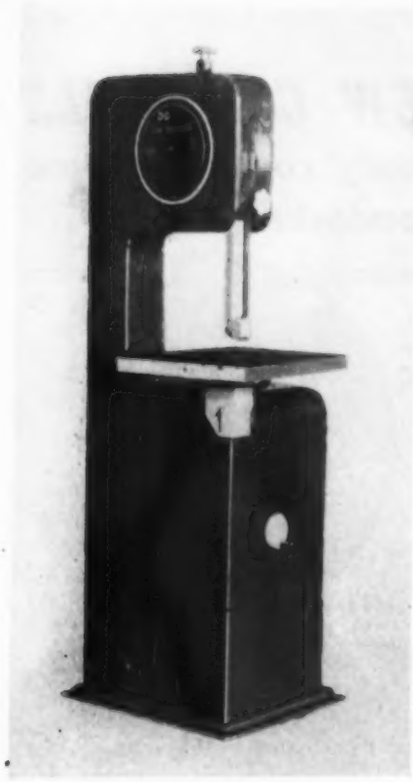
4.

PIONEERS OF H.S.S. BROACHING

COLONIAL

BROACH CO. DETROIT 13

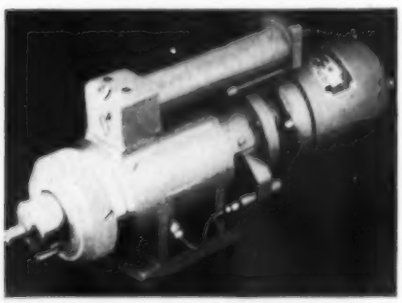
BEST BY TEST



DoAll Utility Sawing Machine Is a 16-in. Convertible Model

A series of mass-produced, full-size sawing machines is offered by The DoAll Co., Des Plaines, Ill. This 16-in. convertible model permits the use of exactly as much saw as needed. The models range in price and progressive usefulness from the basic single-speed saw to a machine with double-range variable-speed control and equipped for sawing, filing and polishing operations.

The shell is pressed steel, inclosing all working parts. Motor and drive mechanism are isolated by a steel baffle plate. Throat depth is 16 in., work-thickness capacity is 12⅛ in., table size is 20x20 in.



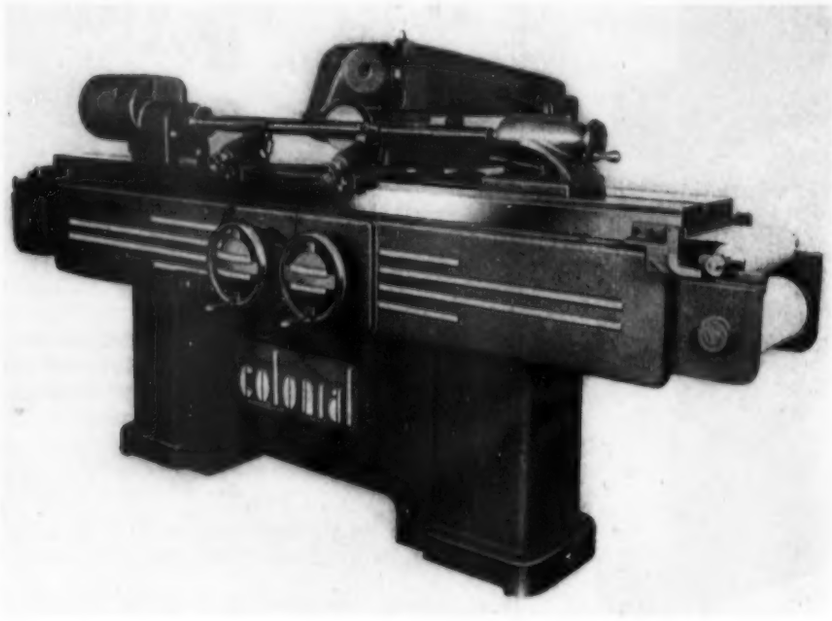
Cleveland Republic's Drill Unit Offers Feed Unaffected by Speed

A drill unit is offered by the Cleveland Republic Tool Corp., 9615 Meech Ave., Cleveland 5, Ohio. The speed of the motor does not affect the rate of feed which is hydraulic. On the working part of the stroke, the piston is moved forward pneumatically and oil on the opposite side of the piston is forced through a metering valve from the cylinder into a small oil chamber.

Air is applied to the piston in the small oil chamber and the oil is forced out through a check valve to return the main piston to its original starting position. A second oil chamber permits the tool to approach the work rapidly at the rate of 200 ipm. before assuming its feed rate, which is variable from 0.0005 to 1/16 in. per rev. This is accomplished without the use of outside links, springs, cams, or valves.

The length of travel of the drill is controlled by a micrometer stop that permits setting the depth of the hole in thousandths. Where automatic operation is desired a switch actuated by the oil pressure is incorporated to return the quill as soon as it hits the micrometer stop.

Power is furnished by either ¼- or 1/3-hp. motor, direct-drive, pulley-drive, or geared-head constant-speed motor. The capacity of the drill unit is from No. 80 drill to 5/16 in. in cast iron and ¼-in. dia. drill in steel. The maximum stroke including the rapid approach is 1¼ in.



Colonial Line of Broach Sharpeners For Handling Flat, Round Broaches

A line of broach sharpeners, comprising seven basic models, is offered by Colonial Broach Co., Box 37, Harper Station, Detroit 13, Mich. The line includes two sizes of machines for sharpening flat broaches; three for sharpening round broaches; and two sizes which will handle both flat and round broaches.

The flat-broach sharpeners will handle broaches up to 8 in. wide and up to 32 in. and 65 in. long at one setting, respectively. The round-broach sharpeners will take broaches up to 6 in. in dia. and up to 36, 72 and 84 in. long, respectively. Machines are designed to handle all types of round broaches including spline, serration, and other types.

The two universal models will handle round broaches having diameters up to 6 in. and up to 72 and 84 in. long, respectively, and flat broaches up to 8 in. wide and 65 in. and 77 in. long, respectively.

Grinding wheels and headstocks on these sharpeners are equipped with built-in motors. The spindles of the grinding wheels on all machines have a standard speed of 4000 rpm. which can be increased to a maximum of 10,000 rpm. through use of special pulleys. Headstocks for sharpening round broaches as well as on the universal models have two-speed gearing for spindle speeds of 200 and 400 rpm. The model illustrated is the Colonial universal type.

Another Special Machine by Cross

Cross Method Cuts Both Initial Investment and Piece Costs

Because Cross has standardized on many units used in its special machine tools, it has reduced the initial cost of such equipment. This has made it economically possible to combine a variety of operations in one machine. As a result, manufacturing and handling costs per piece are drastically sliced.

For example, milling, drilling, boring, reaming, and tapping are united in the new and specially designed machine shown above, to process an oil pump body completely except for precision boring the gear pockets.

Perhaps *you*, like other manufacturers, can take advantage of standard Cross columns, way-type feed units, index tables, index trunnions, drilling, tapping, and milling spindles, and other component parts which can be combined in innumerable ways to solve your production problems.

PART: Oil Pump Body.

OPERATION: Mill both ends, drill two mounting holes L. H. end, drill and tap four cover holes R. H. end, drill and ream two bearing holes, rough and semi-finish two gear pockets, form pressure relief cavity.

PRODUCTION: 63 pieces per hour.

EQUIPMENT: Ten-Station Trunnion Type Machine.

FEATURES: ☆ Ten-station power operated index trunnion ☆ Nine pieces cut at a time progressively ☆ Independent station for loading and unloading while the machine is cutting ☆ Fluid drive index with overload protection for safety ☆ Automatic relief for milling cutters during return stroke ☆ Flexibility for part design changes through use of standard Cross index assemblies and way-type feed units ☆ Hardened and ground steel ways ☆ Hydraulic feed for drilling, reaming and milling ☆ Lead screw feed for tapping.

Investigate Cross Transfer-matics—the newest machine tool development for continuous automatic production.

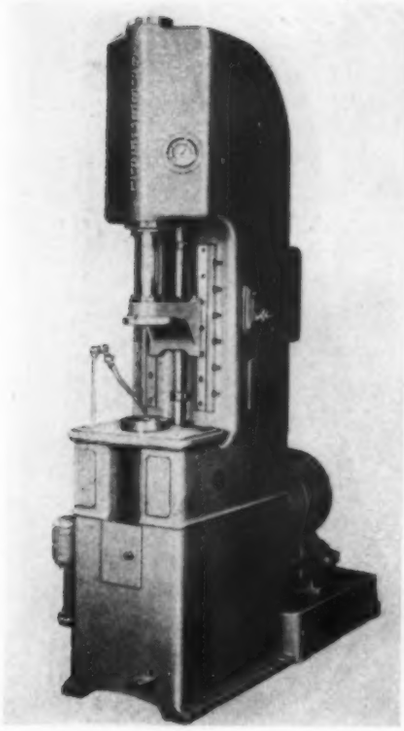
THE CROSS COMPANY

Established 1898

SPECIAL MACHINE TOOLS

MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING

DETROIT 7, MICHIGAN



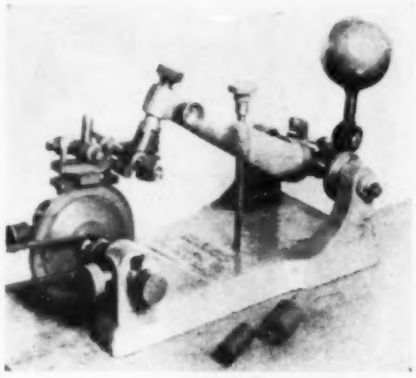
Greenerd Self-Contained Machine For Broaching, Assembly, Die Work

The G6-S-W-C broaching and guided-assembly press is introduced by the Greenerd Arbor Press Co., Nashua, N. H. The self-contained machine was designed as a rugged, rigid press with a minimum of deflection for broaching and assembling requiring accurate alignment. It is used for wet or dry broaching, assembly and die work.

The 2 7/16-in. dia. high-alloy-steel heat-treated and ground ram is guided on heat-treated and ground ways. Speed of the ram down is adjustable from 20 ipm. to 300 ipm. with a return speed up at the rate of 460 ipm. Press is equipped with coolant for wet broaching. The machine has a maximum pressure of 6 tons and is driven with a 10-hp. motor. Maximum daylight is 21 in., minimum 3 in.

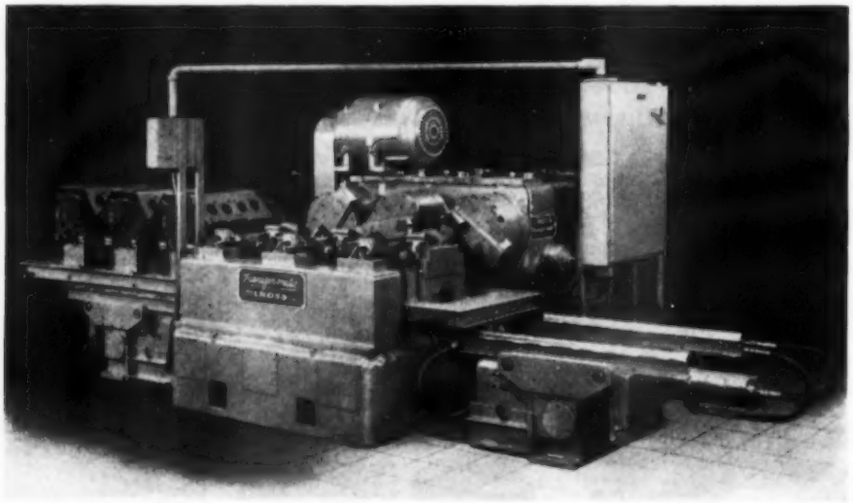
Small-Sized Electric Tachometer Designed for Continuous Operation

A small-size electric tachometer designed for continuous operation is introduced by the Electric Tachometer Corp., 2218 Vine St., Philadelphia 3, Pa. The unit measures 2¾ x 5⅜ in. It is housed in a cast-bronze case, and will operate in any position through a wide range of temperatures. Listed as Model M-1200, it is equipped with a large driving shaft. Various shaft arrangements are available.



Cemented-Carbide Sawing Machine Incorporates a Gravity-Type Feed

A gravity-feed cemented-carbide sawing machine has been developed by Howell G. Macduff & Co., 91 Prescott St., Worcester 5, Mass. The machine is driven from a line shaft or individual motor and will cut round, rectangular, square, or triangular pieces with a minimum amount of attention on the part of an operator. Standard 4-in. diamond impregnated cut-off wheels or laps are employed. The rate of feed is determined by adjustment of a ball weight on the workarm. Less time is said to be consumed in cutting than with a fixed-feed machine. Wheels are kept clean by a saturated wick or piece of felt.



CYLINDER-BLOCK ASSEMBLIES are faced at the transmission joint, square with a crankshaft bore at the rate of 56 per hour on a special machine built by the Cross Co., Detroit 7, Mich. Transfer location and clamping are automatic, and three blocks are faced simultaneously by single-point carbide facing tools. Hydraulic valves are gasket-mounted and continuously located. Standard units may be added to the transfer mechanism for expanding the utility of machine

Pneumatic Cleco Impact Wrench Powers Bolting-Up Operations

A pneumatic impact wrench rated for ⅜-in. bolts is being produced by Cleco Div., Reed Roller Bit Co., Box 2119, Houston, Tex. Applications are bolting up, nut running, reaming, tapping, stud setting and even drilling.

The wrench has no springs or other fragile parts, and it is reversible.

3 MINUTES = UP TO 10 × > CONVENTIONAL

with the New Monarch Air-Gage Tracer Packaged Unit

WHAT THE AIR-GAGE TRACER PACKAGED UNIT DOES

- Permits conversion of a Monarch Engine Lathe into a fully automatic cycle machine in 3 minutes—or less.
- Combines the power and flexibility of a fast, modern engine lathe with automatic template control of size and shape.
- Requires operator only for loading, unloading and pressing cycle start button, thus permitting one operator to handle two machines—easily.
- Because of individual motor-driven feed, it permits selection of the exact feed for top cutting tool efficiency on every job.
- Permits return to conventional operation in less than one half minute.
- Increases production up to 10 times, yet provides flexibility of operation —with a minimum investment in equipment.

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

Mathematically speaking, that isn't a perfect equation. But the story it tells *is* perfect—as an answer to rising production costs in metal turning.

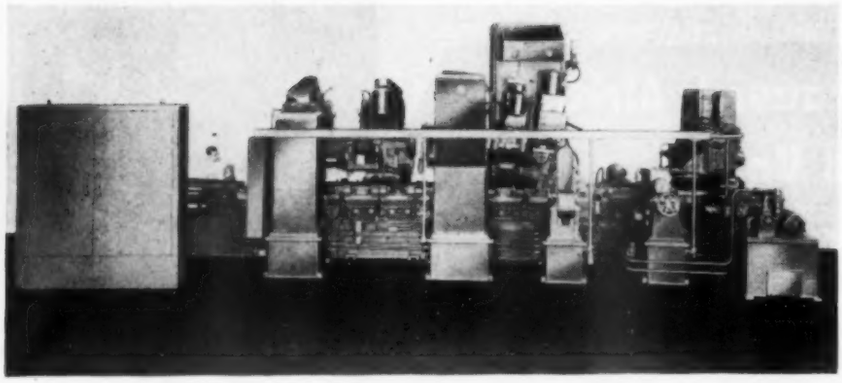
What that equation says is that the new Monarch Air-Gage Tracer Packaged Unit, which can change a standard Monarch production lathe from manual to automatic operation in three minutes, will increase production as much as ten times over conventional methods.

This new Packaged Unit, applicable as factory equipment on standard Monarch Engine Lathes, combines the time-saving, cost-cutting advantages of the Air-Gage Tracer with a variable feed and rapid-traverse return, making a completely-automatic cycle lathe. The result is a precision machine that provides maximum production on single pieces or large-lot runs—at a reasonable initial investment cost.

If your production includes multiple-diameter shafts, or the turning, boring or facing of contours, it will pay you to investigate the savings made possible by Air-Gage Tracer Packaged Unit Operation. Get the full facts *now*. Ask for bulletin 2604.

THE MONARCH MACHINE TOOL COMPANY
Sidney, Ohio

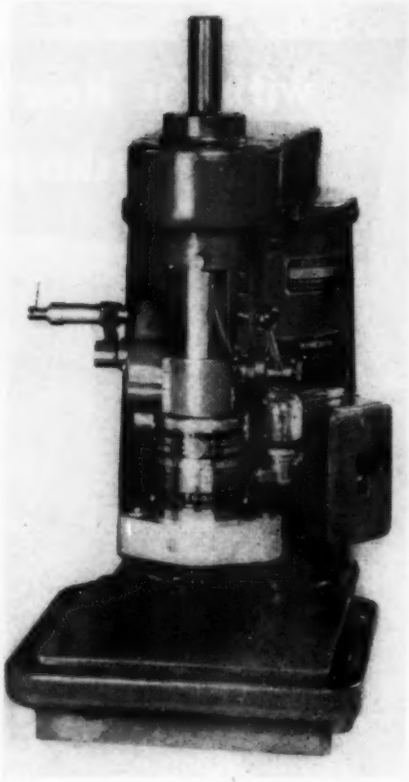
FOR A GOOD TURN FASTER — TURN TO MONARCH

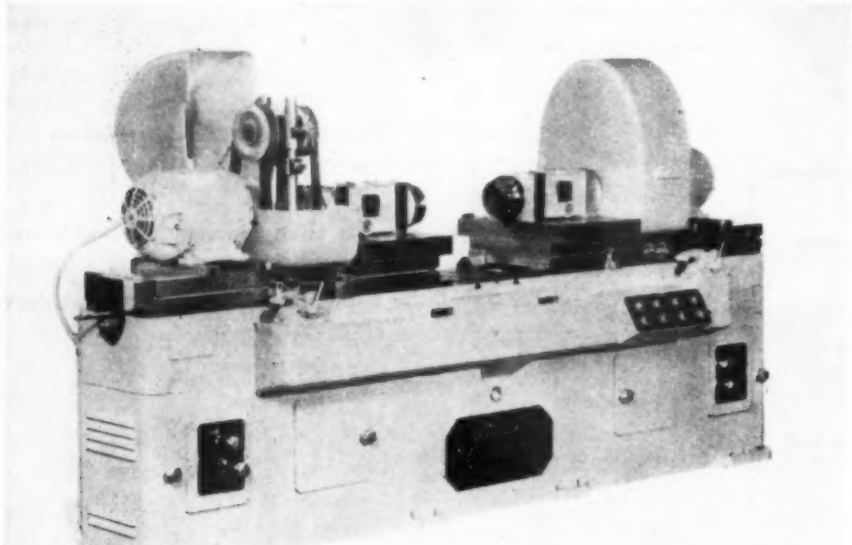


Transfer-Type Machine by Snyder For Automotive Intake Manifolds

Automotive intake manifolds are transferred by a machine built by Snyder Tool & Engineering Co., 3440 E. Lafayette St., Detroit, Mich. Cycle time for working 57 holes is 48 sec.

The machine has eleven work stations, one load station and one unloading station. Hydraulic piping and wiring is provided with junctions so that the machine can be moved in 5 sec. and readily reconnected. Bedded columns are welded steel. Drilling, reaming, spot-facing, tapping, countersinking and threading operations are completed in the eleven stations. Production is 60 parts per hour at 80 percent efficiency. Floor space is 369 in. x 123 in.





Precision Boring Machine Offers Sealed Lubrication

A new Precision Boring Machine, made by Simplex Machine Tool Division, Stokerunit Corp., Milwaukee, Wis., has been put in production. Model 2UA incorporates a new sealed lubrication system in the boring heads to keep out foreign matter and to improve cooling.

The one-piece bed machine features simplified spindle drive details and new cooling troughs. New bridge designs are claimed to permit greater use of multiple-head installations. The unit-type hydraulic systems isolate vibration and heat from the machines, and all piping is manifolded for removal of the hydraulic systems for cleaning.

Zagar Gearless Drillheads Are Small for Light Work

A gearless drillhead is offered by Zagar Tool, Inc., 23880 Lakeland Blvd., Cleveland 17, Ohio, and is shown mounted on a Sigourney Sensitive drillpress for lightweight work. The housing and drive mechanism are an integral part of the main spindle assembly. The original drillpress spindle is taken out completely and inserted in its place is the multiple-spindle drilling head. The head has eight spindles on a 1-in. circle. Drillhead can be adapted to other drillpresses in a similar manner. Guide pin bushings tie the head in with the drill jig.

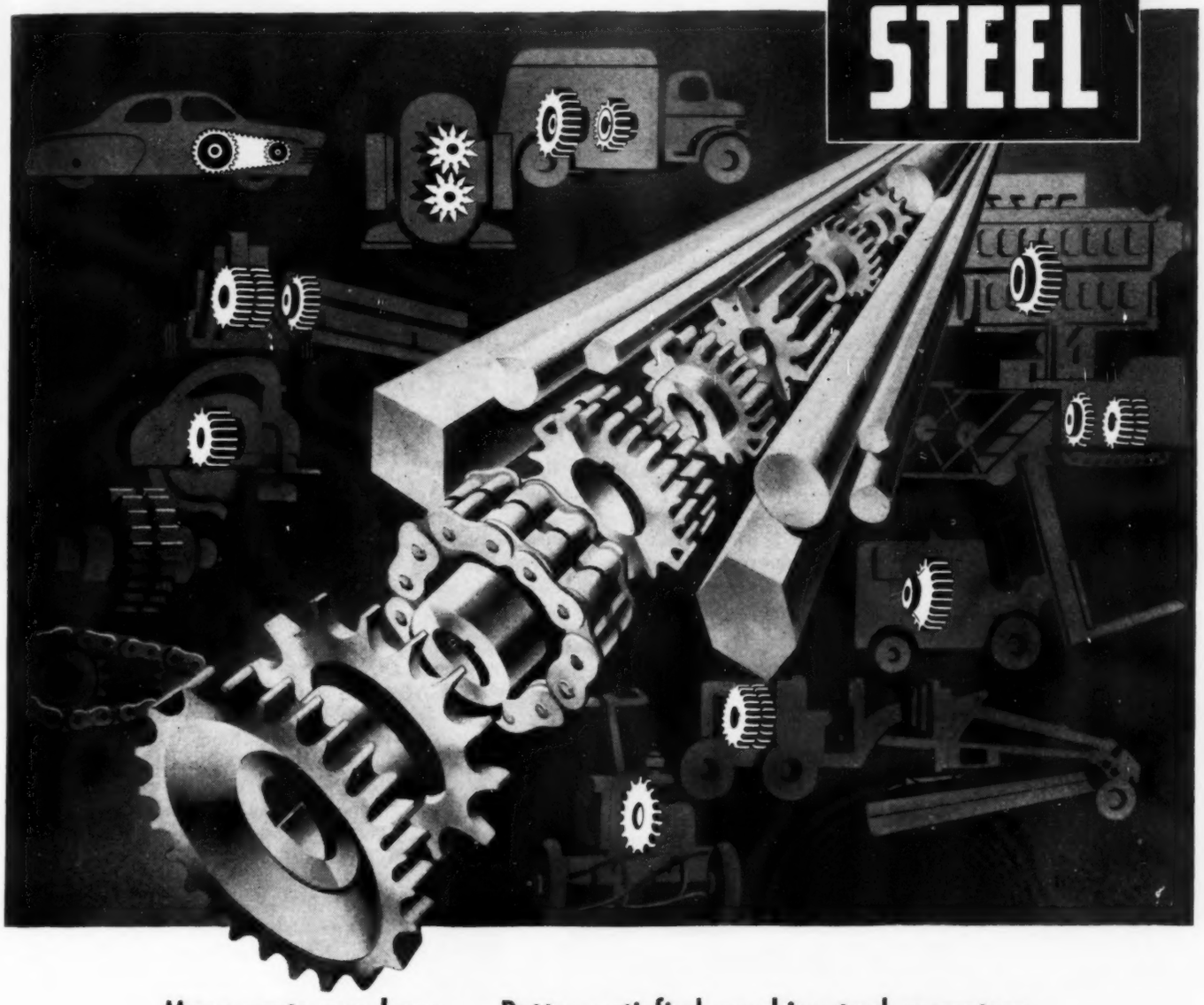
Cable-Type Trolley Conveyor Incorporates Overhead Design

The FlexoiD overhead-cable-type trolley conveyor is offered by Smith Power Transmission Co., 1545 E. 23rd St., Cleveland, Ohio. Featuring rugged construction with a roller chain-type driving sprocket, it permits trolley spacing to 1¼-in. increments.

Trolleys are cast split design to eliminate threading on cable and also ease in adding, removing, or changing center of trolleys. The conveyor will operate in a horizontal plane, 45° max., and rise or dip in a vertical plane.

LINK-BELT makes more and better sprockets
with **J&L JALCASE STEEL**

J&L STEEL



More parts per hour . . . Better satisfied machine-tool operators with this original, free-machining, open-hearth steel

Link-Belt men like J&L Jalcase steel because it machines freely at high speeds, is easy to heat treat and the parts have a fine finish. They get more pieces per hour because Jalcase is uniform.

Their machinists particularly like Jalcase. They get higher production because of easier machinability, faster operation and extra long tool service.

Link-Belt is the world's largest manufacturer of conveyor and power transmission equipment—and a large producer of sprockets and chains used throughout all industry. Jalcase, because of its unique combination of free-machining and heat-treating properties, helps Link-Belt overcome the ever-increasing cost of production. This means:

- **Lower unit cost**
- **Finer finish on completed parts**
- **Higher physical properties**
- **Longer tool life**
- **Less down-time**
- **Less wear on machine tools**

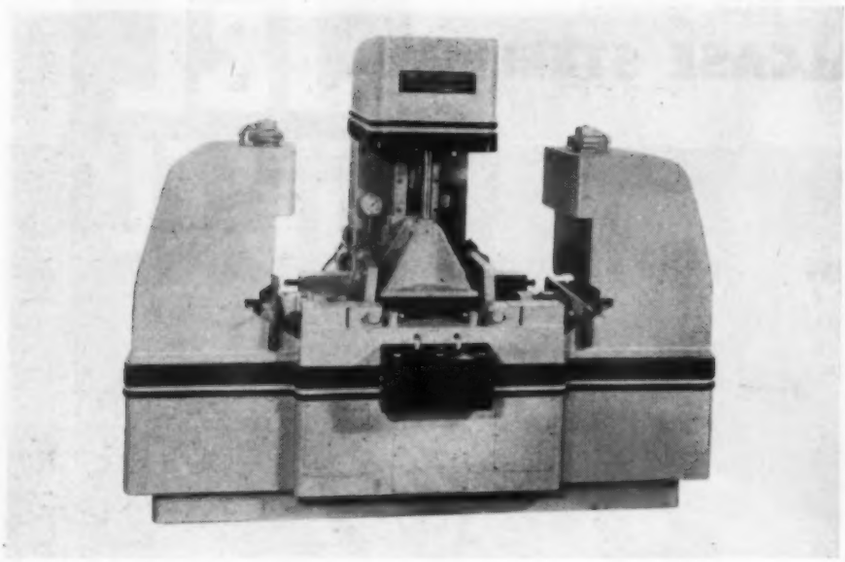
We should like to tell you more about JALCASE—the *original*, open hearth, free-machining steel. The coupon below is for your convenience.

Jones & Laughlin Steel Corporation
402 Jones & Laughlin Building
Pittsburgh 30, Pennsylvania

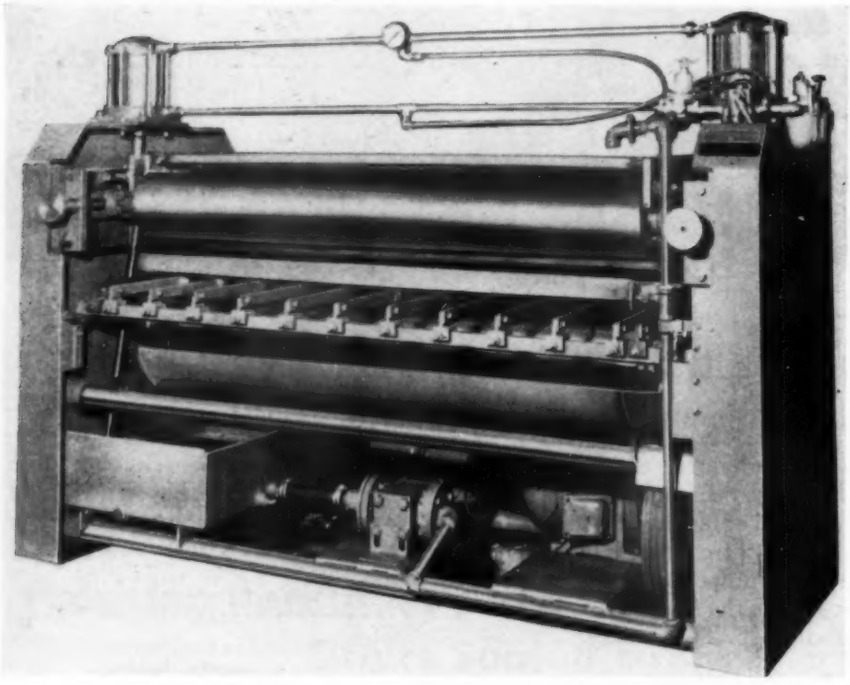
Please send me complete data on JALCASE—the *original*, open hearth, free-machining steel.

Name_____
Title_____
Address_____
City_____ State_____

JONES & LAUGHLIN STEEL CORPORATION



THREE FORMING UNITS make three separate bends to shape complete tub sides and backs of dish-washing machines in a cabinet-forming machine manufactured by Cyril Bath Co., 6910 Machinery Ave., Cleveland, Ohio. Two outside heads contain forming slides which automatically form the curl and the reverse lip on the extreme ends of the part. The center forming punch makes two large radii bends with the assistance of wing-type rocker plates. Action is automatic through hydraulic power. The three operations are performed simultaneously. The machine can produce 40 cabinets per hour from 18- or 20-gage cold-rolled enameling steel



ROLL-COATING MACHINE for the application of drawing compound to sheet steel is offered by the Bertsch Machinery Co., 2832 East Grand Blvd., Detroit 11, Mich., Dept. H. Up to 1/4-in. thick and any length can be coated in widths ranging from 24 to 72 in. The machine is said to insure applications of the compound on either or both sides of the blank simultaneously prior to insertion in the die cavity. The drawing compound can be applied in any desired quantity through the use of a controlled spreading roll. Thickness requirements vary from a very thin spread for drawing compounds with a plastic base to a more generous application of the water-soluble and soap-borax types

15-Ton Deep-Throat Press Features an 18-in. Throat

A 15-ton Rousselle deep-throat press, No. 2-G, has been added to the line of open-back inclinable and adjustable bed-horn punch presses manufactured by Service Machine Co., 7627-33 S. Ashland Ave., Chicago 20, Ill. An 18-in. throat permits working to the center of 36-in. sheets.

The bolster plate measures 11x16 in. ,and the shut die height is 7¾ in. to the bed. The press has a standard 2-in. stroke. The press is designed so that the bed protrudes, allowing clearance for jobs that might ordinarily require horn presses.

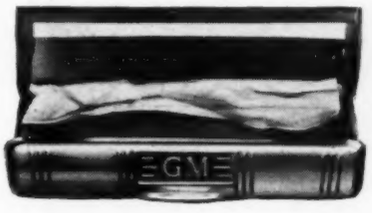
The bed has a 6-in. opening allowing blanks and slugs to fall through. It is equipped with a single-stroke or continuous clutch, roller bearing flywheel, air-cooled brake and hinged motor mount. The press operates at 200 rpm. with a 1-hp. 1750-rpm. motor. Weight complete is 1875 lb. The frame is a one-piece semi-steel alloyed casting.

Solderless Wiring Hand Tools Offered by Aircraft Marine

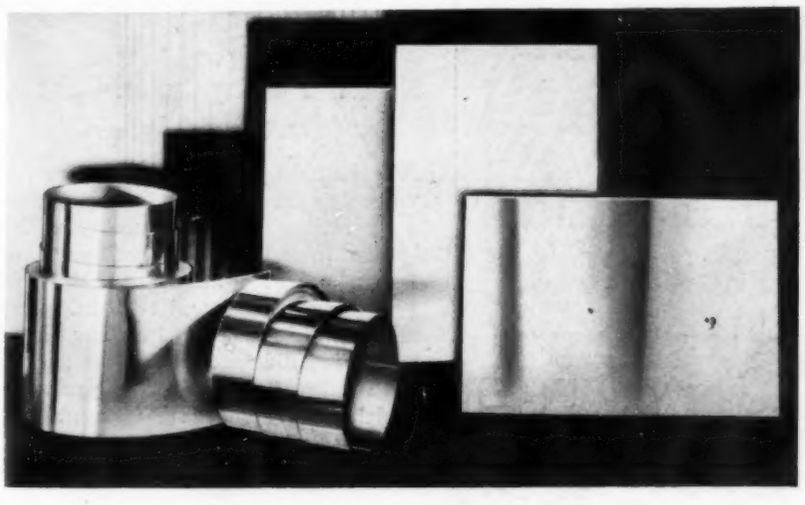
Aircraft Marine Products, Inc., 1577 N. 4th St., Harrisburg, Pa., offers a line of solderless wiring hand tools for wiring applications requiring installation of solderless terminals by manually operated tools. Called "Certi-Crimp," the tools incorporate a device that prevents re-opening of the tool for admission of a new terminal until it has been completely closed for a perfect crimp on a previous terminal.

Highly Plated Sheets and Coils Can Be Successfully Fabricated

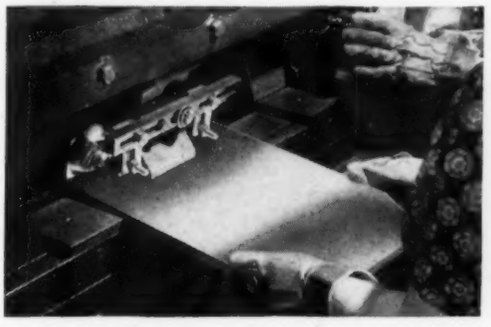
Despite their highly finished plated surface, pre-plated metals in sheets and coils can be successfully fabricated under modern mechanical production methods. Nickeloid Metals save the headaches of specialized departments and eliminate as many as three manufacturing steps, such as cleaning, plating, and polishing. It is not hard to maintain the lustrous finish of Nickeloid Metals. Choice of the proper metal, care in the making and handling of die equipment and the same handling care given any *finished* part — are points of good shop practice to be observed. Nickeloid pre-plated Metals may be soldered, riveted, blanked, drawn, formed, bent, spot welded, seamed, etched, and lithographed or silk screen printed. With some base metals, room temperature is important. For best results bends should be made against rather than with the grain. The larger the radius of the bend the less distortion of finish. For situations where unusually severe production conditions prevail, Mar-Not paper or plastic film applied to the face of the metal affords absolute protection; yet peels off as easily as a banana skin.



Nickeloid Metals are available in finishes of Nickel, Chromium, Brass or Copper electroplated to base metals of zinc, steel, brass, copper, or aluminum. Also colors on steel or zinc. Available in sheets, long continuous coils, or long flat strips . . . wide range of gauges and tempers . . . plated one or two sides . . . bright or satin finish . . . and all finishes supplied in numerous attractive crimps, patterns and corrugations.

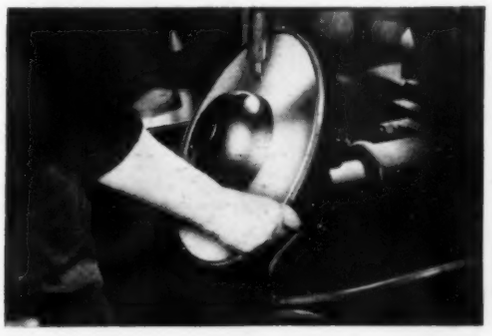


Blanking is a common operation with Nickeloid Metals. With good shop practice, results are highly successful.



Bending of Nickeloid Metals, with power brake, press brake, or folder, presents no difficulties in fabrication.

Thousands of plants are successfully stamping Nickeloid Metals. Workman is stamping Kleenex dispenser (shown at left).



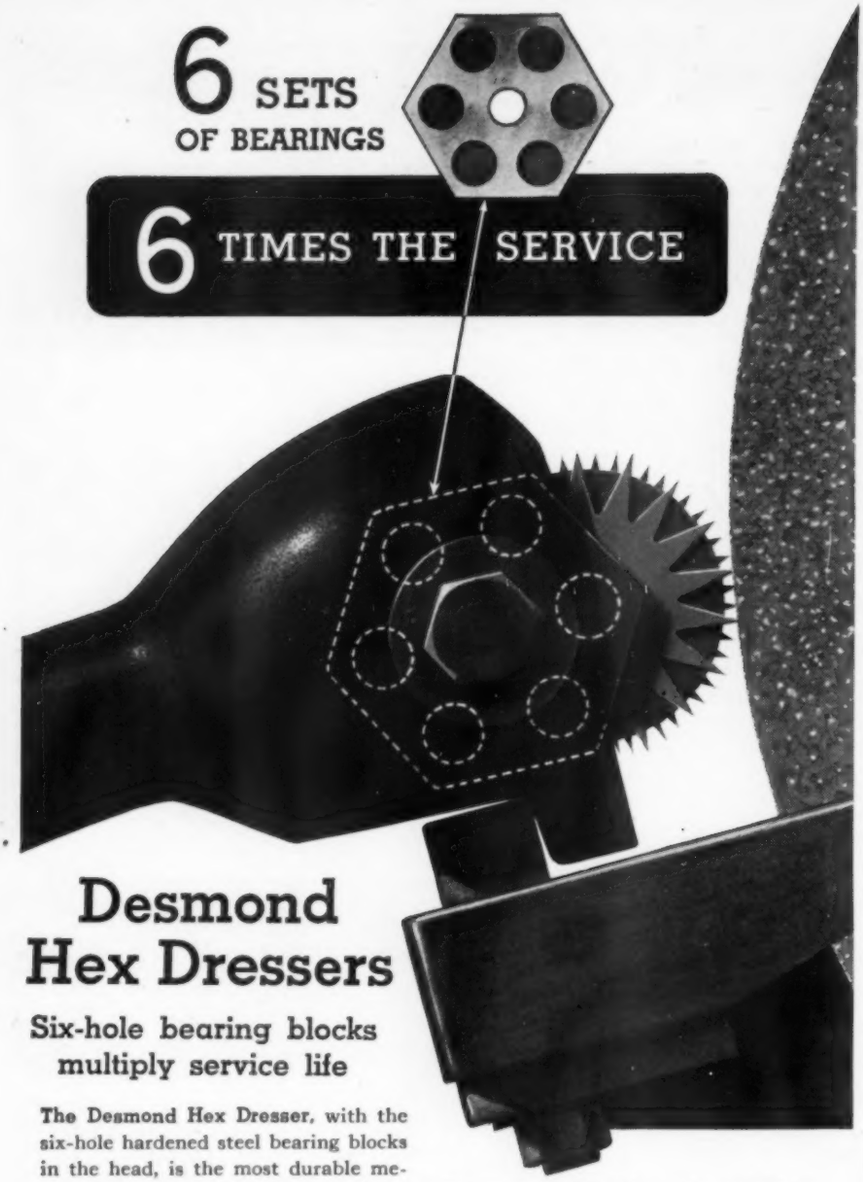
Nickeloid Metals may be spot welded without damage to their highly polished surface, as shown above.

BOOKLET FREE These interested in methods of fabrication of pre-plated Nickeloid Metals should write on their company stationery for our illustrated Fabrication Handbook. It's free.

AMERICAN NICKELOID CO.
PERU 7, ILLINOIS

6 SETS OF BEARINGS

6 TIMES THE SERVICE



Desmond Hex Dressers

Six-hole bearing blocks multiply service life

The Desmond Hex Dresser, with the six-hole hardened steel bearing blocks in the head, is the most durable mechanical dresser made. As one pair of holes wears, merely turn the block to a new set. No wear on the handle. When all six sets have been used, it's a simple matter to loosen the side screws, remove the cutter assembly and replace the blocks. Made in five sizes and using Huntington cutters of corresponding size.

Desmond makes the only *complete* line of grinding wheel dressers on the market. To you, this means the right tool for every job . . . and, in turn, better performance and longer life from your grinding wheels.

Write for the catalog of our complete line and the name of your nearest Desmond distributor.

THE DESMOND-STEPHAN MFG. COMPANY • URBANA, OHIO

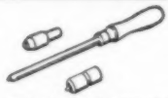
Desmond

the only complete line of grinding wheel

DRESSERS & CUTTERS

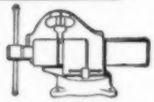
BALL BEARING DRESSERS

REVOLVING CUTTER TYPE DRESSERS



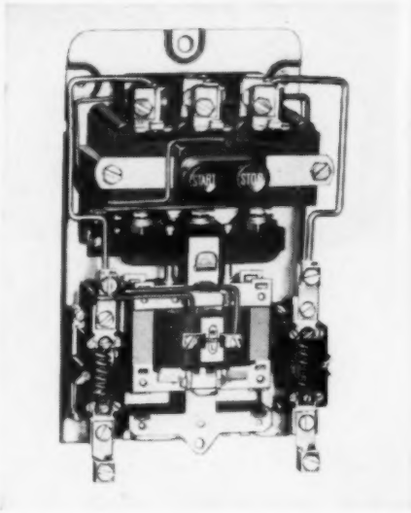
DIAMOND HAND TOOLS AND NIBS

WHEEL TYPE DRESSERS

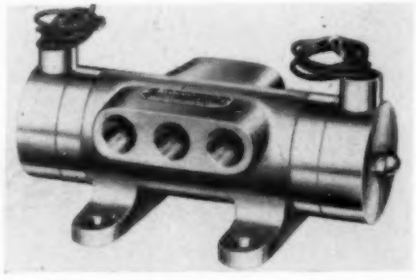


SIMPLEX STEEL-SLIDE VISES

Parts and Materials



MAGNETIC STARTER, Bulletin 4112 Size 2 a.c. is made by Ward Leonard Electric Co., Mount Vernon, N. Y. The solenoid-operated starters are intended for applications where across-the-line, non-reversing starting of polyphase squirrel-cage induction motors and single-phase motors are permissible. Starters are available with open-type construction for built-in or specialized controls or with NEMA Type I general-purpose inclosures. Starters have a maximum enclosed rating of 25 hp., 440-550 volts, 3 phase, 60 cycles



Modernair 4-Way Control Valve For Operation on 150 psi. Max.

A solenoid-operated 4-way control valve is offered by Modernair Corp., 4222 Hollis St., Oakland 8, Calif. Part of their CV control-valve series, it measures 7¼ in. over-all for the ⅜-in. port model, and 10⅜ in. over-all for the ¾-in. port size. The valve piston is solid machined brass sealed with aircraft-type O-ring packings which are replaceable without disturbing piping connections. The valve is designed for operation on

Cuts "Time-Out" for Lubrication up to 64%

Increases Productive Time of Machines by Mechanizing the Handling and Application of Lubricants

Your Lubrication Methods May be More Antiquated Than You Suspect

If your oilers are still lubricating your machines by hand, bearing by bearing, you're losing manhours and cutting productive time of your machines. It's time to check up! The Alemite Representative is a specialist in modern methods of handling and applying lubricants. A five minute conference with him can easily show you new cost-cutting opportunities. Write to Alemite, [illegible] Diversey Parkway, Chicago 14, Illinois. Call your Alemite jobber.

If you lubricate your machines with hand guns, here's news for you. By actual time-study, a new Alemite Method of power lubrication is 64% faster from barrel-to-bearing than the best hand grease gun methods. To say it another way—you can save up to 23.9 hours in applying each 100 pounds of grease!

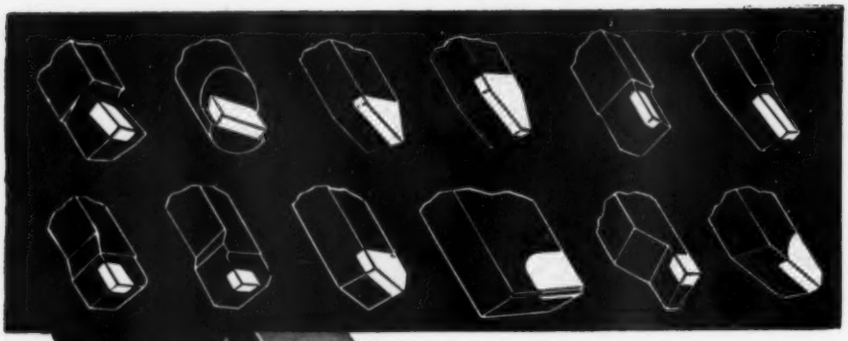
It's the new 25 pound capacity Alemite Portable Electric Powergun. It's fast, it's positive, it develops 5000 lbs. grease pressure. And it helps add more productive time to machines . . . gives you extra hours to use for much needed preventive maintenance.

Just one of many ways that Alemite Methods help industry cut production costs through simplified lubrication procedures. The Alemite Representative can show you case after case where time-study analysis has proved that Alemite Methods reduce maintenance costs. These methods eliminate costly time-consuming handling of oils and greases . . . slash "time-out" for lubrication . . . keep dirt and moisture out of lubricants . . . completely mechanize lubrication from barrel-to-bearing . . . save grease. These benefits all add up to lower production costs. Get the complete facts, today.

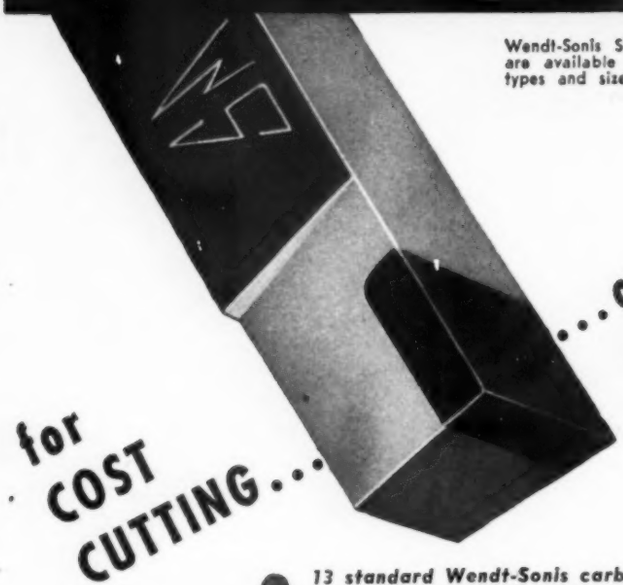
ALEMITE

Another Product of STEWART WARNER

MODERN LUBRICATION METHODS THAT CUT PRODUCTION COSTS



Wendt-Sonis Standard Carbide Tools are available in a wide variety of types and sizes.



for COST CUTTING . . . . . on CUTTING JOBS

- *13 standard Wendt-Sonis carbide tipped tools will perform over 80% of a plant's tool bit operations.*
- *Wendt-Sonis standard tool bits can be supplied with any grade of carbide required.*
- *Standard Wendt-Sonis tool bits are stocked in Carboloy and Kennametal grades of carbide for universal machining operations.*
- *Nationwide sales and service organization of established W-S distributors stocks a complete line of W-S standard products.*

W-S standard tool bits are "Color Marked" for easy identification as to use on steel or non-ferrous materials. All shanks are rust resistant — also heat-treated for greater rigidity. Cutting edges are diamond ground for longer wear and better finish. Use W-S carbide tools to increase your production . . . combat rising costs!

Free! NEW CHIP-BREAKER CHART

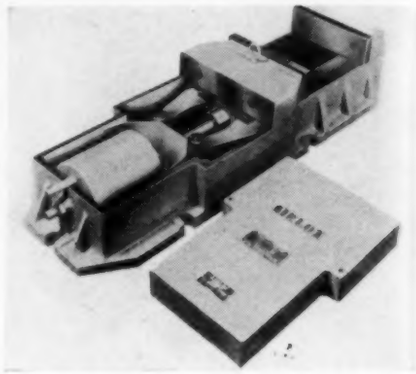
Contains illustrations of chip-breakers, grinding instructions, and recommendations for their use. Chart size — with handy tab for wall hanging. To get FREE chart WRITE: Wendt-Sonis Company, Hannibal, Missouri or 580 N. Prairie Ave., Hawthorne, Calif.; 1361 West Lake St., Chicago, Illinois — Warehousing Facilities: Eastern Carbide Corp., 909 Main St., New Rochelle, N. Y.

WENDT SONIS

CARBIDE TIPPED CUTTING TOOLS

BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS • CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS • TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER TURNING TOOLS • SPECIAL BITS

maximum line pressures of 150 psi. Coils are furnished as standard for 110/220-v. current operation with current consumption on 110 v. of 1 amp.



Airlox Senior Pneumatic Vise Has Grip Power Ratio of 200:1

Production Devices, Inc., Whitehall, N. Y., offers the Airlox Senior Model S-200 pneumatic vise designed primarily to do production workholding on the 40- to 50-hp. milling machines. A gripping power ratio of 200 to 1 is offered. An airline pressure of 200 lb. can be used safely on the vise. Over-all length is 45 in., over-all width, 13⅛. The maximum jaw opening is 12 in. between castings.

Hobart High-Frequency Stabilizer For AC. Transformer-Type Welders

An inert-gas welding attachment for ac. transformer-type welders has been developed by Hobart Bros. Co., Troy, Ohio. The high-frequency stabilizer is designed for use with standard ac. transformer-type welders of 500 amp. or less. It provides a magnetic contactor which turns welding current and high frequency on and off, and operates the magnetic valves for turning water and gas on and off.

A time relay controls the magnetic valves, so that the flow of gas

How to Build Stronger, Lighter Levers at Less Cost

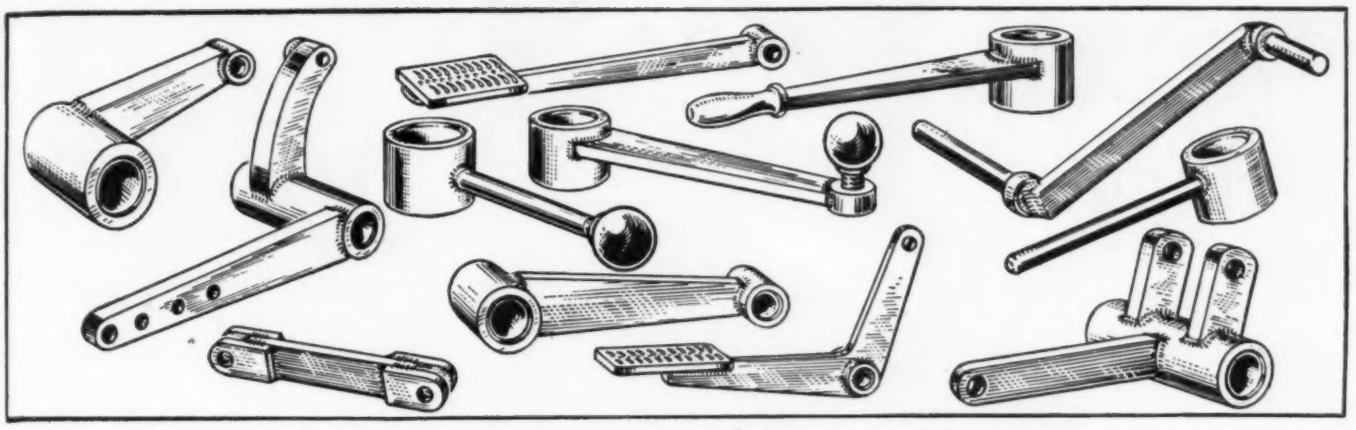


Fig. 1. Typical machinery operating levers that are being weld-fabricated at lower cost with arc welding.

ALL types of levers are being weld-fabricated in shops throughout the country, helping to produce stronger, lighter machinery construction with improved appearance . . . *all at less cost than with other methods.* Here is how these levers are built:

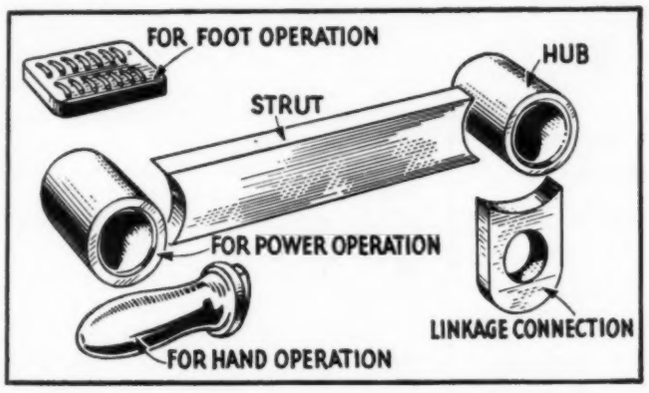


Fig. 2. Basic elements of levers for different types of operation.

More detailed data on the design of levers for arc welding is contained in the "Procedure Handbook of Arc Welding Design and Practice." Price $1.50 postpaid in the U. S. A.; elsewhere $2.00.

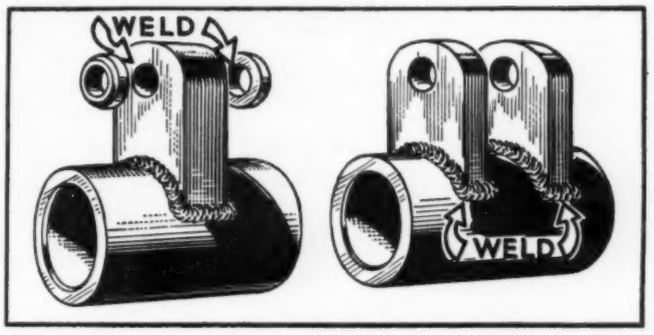


Fig. 3. Linkage connections for power take-off, made from steel straps.

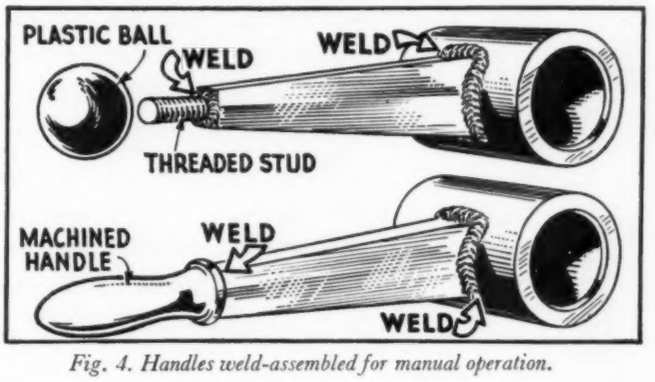


Fig. 4. Handles weld-assembled for manual operation.

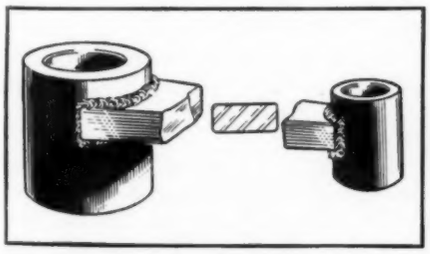


Fig. 5. Plain rectangular strut welded to hubs. For normal loads.

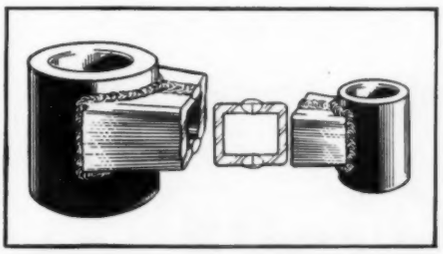


Fig. 6. "Box" section design strut for strong, light-weight construction.

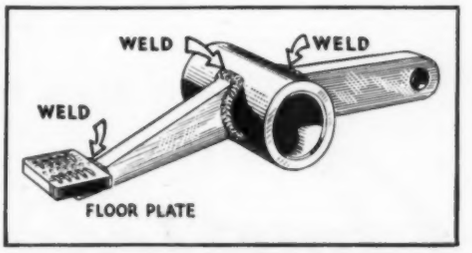
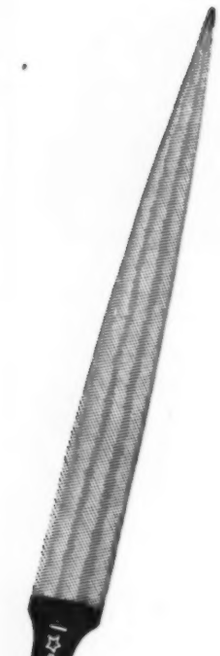


Fig. 7. Floor plate weld-attached for foot operation.

The above is published by LINCOLN ELECTRIC in the interests of progress. Machine Design Studies are available to engineers and designers. Write on your letterhead to The Lincoln Electric Company, Dept. 39, Cleveland 1, Ohio. **Advertisement**

Have you a "SMALL PARTS" Filing Job ?



USE

"AMERICAN SWISS" SWISS-PATTERN FILES

Small fillets, holes, slots, curves, edges and surfaces may seem to be troublesome filing jobs—but not if you use "American Swiss" Swiss-Pattern Files. When you standardize on this extensive line of precision tools, you have a selection of more than 3000 different shapes, cuts and sizes to choose from—including widths and diameters as small as 1/16-in., thicknesses as small as 22 B&S (.025) gauge and cuts as fine as 200 or more teeth per inch. So, for "small parts" filing, as well as for all accurate or finishing filing, use "American Swiss" files—they will help you do better, faster, more economical work.

Buy from Our Local Distributor

American Swiss File & Tool Co., Elizabeth 1, N. J.

ASK FOR THEM BY THIS NAME

American Swiss ★★★

SWISS PATTERN FILES

and water continues for a predetermined time after the arc has been extinguished. This protects the weld metal from oxidation until it has had time to solidify. The attachment is provided in a steel case 21 in. high, 19 in. wide and 18½ in. deep. Net weight is 125 lb.

AC. and DC. Reversing Contactor Controls Intermittent Duty Motors

A compact ac. and dc. reversing contactor designed to control small motors used in connection with small hoists, mechanical speed changers and other intermittent-duty applications, has been developed by the Industrial Controller Division of the Square D Co., 4041 N. Richards St., Milwaukee 12, Wis. Double-magnet frames and contact blocks with two three-pole armature assemblies are mounted on one base and mechanically interlocked.

The device has straight-line vertical action. Double-break, silver-to-silver contacts eliminate flexible leads and give low-contact resistance. The contractors are suitable for use with ac. polyphase motors rating not higher than 1 hp. and with ac. single-phase and dc. motors rated not more than ¾ hp.

Process for Brazing Magnesium Introduced by Dow Chemical Co.

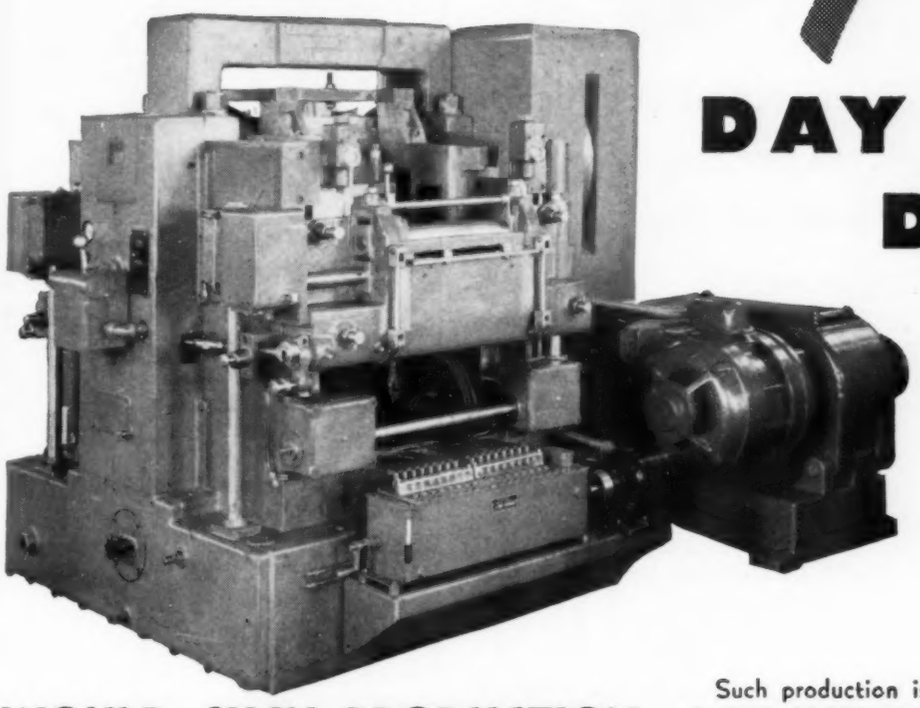
A process for brazing magnesium is offered by the Dow Chemical Co., Midland, Mich. Furnace, flux-dip, and torch-brazing methods are applicable to magnesium. A flux must be present to free surfaces from oxide or other films to permit capillary flow.

For furnace brazing, the parts to be joined are assembled with preplaced brazing alloys, fluxed and heated to the proper temperature in a furnace. In flux dip brazing, the assembled parts are dipped in a molten flux bath.

Torch brazing is similar to gas welding, except that little or no melt-

800 STROKES /min.

DAY IN - DAY OUT



WOULD SUCH PRODUCTION HELP CUT YOUR COSTS?

Figure out for yourself what production records like these could do to your costs on blanking and piercing operations:

One company - 2000 blanks per minute consistently for years.

Another big manufacturer - ONE MILLION laminations for aircraft generators on a SUPER SPEED in a 48-hour week with only one operator.

Again, SUPER SPEED turns out 120,000 pieces per 8-hour day compared to 50,000 with a regular punch press equipped with automatic feed and to 9,000 with a hand-fed punch press.

Such production is revolutionary. The FERRACUTE SUPER SPEED PRESS is itself revolutionary, the die bed reciprocating in a horizontal plane and the punch member taking its motion direct from the crank shaft. There is no lost motion because the material moves continuously while the work is being performed. Production speeds are limited only by the physical characteristics of the product and the maximum speed of the machine. FERRACUTE SUPER SPEED takes standard die sets, reduces die costs because of less frequent grinding. Has worked successfully a considerable variety of metals: electrical grade steel, cold rolled steel, nickel alloy steel, brass, copper, etc. Feed by coil or strip. Models from 250 to 1000 RPM. Write for full details.

SUPER SPEED PRESS

FERRACUTE

MACHINE COMPANY

Super Speed Press Division **BRIDGETON, N. J.**

For 85 years, manufacturers of Power Presses, Press Brakes and Special Machinery

HY-PRO ENGINEERING increased production from 1,000 pieces per tap to 12,000 pieces per tap

PART: Check nut for air-conditioning fan blade.

PROBLEM: Stringy consistency of 1020 steel caused the 3 and 4 flute taps, used on this job, to pick up and seize often breaking the tap on the 1st or 2nd piece. Production never exceeded 1,000 pieces per tap. Did the Hy-Pro Sales Engineer think it possible to design a tap that would increase output per tap?

HY-PRO SOLUTION: Samples sent to the Hy-Pro Engineering Department were studied and tested. They suggested using a two flute spiral point tap with a special Hy-Pro finish. Manufacturer reports average production per tap now exceeds 12,000 pieces.

Above is a typical example of how the Hy-Pro Sales Engineer can help increase threaded-hole production. His expert engineering counsel backed by the most up-to-date tap production methods combine to solve tapping problems rapidly and profitably.

All Hy-Pro Taps are ground from tough uniform quality high-speed steel and given one of the Hy-Pro exclusive surface treatments.

Each tap is completely inspected by the latest electronic quality control equipment, your assurance that there will be no dimensional variance in Hy-Pro Taps of a stated size.

These precision manufacturing methods plus the ability of the Hy-Pro Sales Engineer to prescribe the correct tap for your particular job means *sustained accuracy* on your production line resulting in higher productivity from your tapping machines.

Let Hy-Pro solve your tapping problem—call a Hy-Pro Sales Engineer today.

Order from your distributor.

HY-PRO TAPS

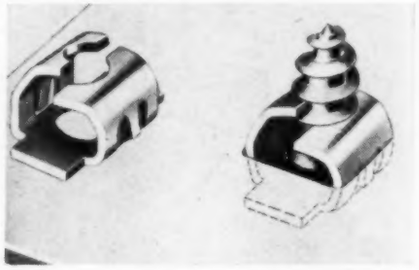
HY-PRO TOOL CO.

NEW BEDFORD, MASSACHUSETTS

A SUBSIDIARY OF CONTINENTAL SCREW COMPANY

ing of the base metal occurs. The brazing process, because of its dependence on capillary flow, especially in furnace and flux dip methods, requires careful design of joints with proper clearance (0.0004-0.010 in.) and proper placement of filler metal.

Magnesium brazing temperatures are between 1975 F. and 1160 F. Brazing of Dowmetal M magnesium alloy is practical on a commercial basis but brazing for other alloys is in the experimental stage.



Prestole Snap Nut Fastener Offered for Blind Locations

A spring-steel snap nut for blind-location sheet-metal assembly is offered by the Prestole Corp., 3135 Bellevue Road, Toledo 6, Ohio. The snap nut is offered for nut-to-panel anchoring in blind attachments and is said to provide features previously only obtained with complex floating-type fasteners. No welding, riveting, clinching or special tools are necessary.

The nut is pressed into assembly position. It is attached directly from the work surface, instead of the reverse side of panel. The nut snaps into a 9/32-in. square hole in panels 0.037 in. to 0.055 in. thick, and is designed for easy entrance of the screw, even in cases of extremely misaligned panels.

As the screw is driven the arched spring arms of the nut expand just enough to permit entry of the screw, locking the fastener to the inner panel and at the same time binding against the root of the screw thread. It will accommodate both No. 8 and No. 10 sheet-metal screws, and will withstand a tightening torque of 35 to 45 lb. in.

Plate-Type Fasteners Offered For Heavy-Duty Conveyor Belts

Plate-type fasteners for heavy-duty conveyor belts have been developed by Armstrong-Bray & Co., Chicago, Ill. Called Plategrip belt fasteners, they pull belt ends together into a smooth, flexible joint. They are made of heavy-gage steel and are designed so that they will withstand any load

The Clearing press shown is a double action, double eccentric mechanical type with a 72" x 84" bed capacity of 350 tons, operating at 4 strokes per minute.

THE HOUR with 420 minutes

Cutting production *time* cuts production *costs*. If, with an equal investment of man-hours, you can turn out seven times as much product, you're putting 420 minutes into every hour.

Compared to old, slow methods of casting, forging, grinding and machining, press methods often speed production far more than sevenfold. Press methods not only reduce costs, but frequently turn out a more useful, more salable product to boot.

If you manufacture a metal article that sells in large quantities—or could sell that way at the right price—it will pay you to consult Clearing. Don't think your job is too big, or too precise, or too intricate. Chances are, Clearing presses are already doing something just as difficult. It costs you nothing to find out.

CLEARING MACHINE CORPORATION

6499 West 65th Street • Chicago 38, Illinois

CLEARING THE WAY TO EFFICIENT MASS PRODUCTION

WHICH OF THESE BOOKS WILL BE MOST PROFITABLE TO YOU?

For √ new ideas √ the hard-to-find fact √ new processes √ the best material or method √ the underlying principle—and in many other ways these books can be helpful to you. Pick the ones you want most and SEE THEM ON APPROVAL.

1000 production aids.

Illustrated Jig-Tooling Dictionary

By T. G. Thompson and R. A. Peterson

988 working drawings, with concise explanations, show you at a glance what you want to know about the design and construction of any piece of tooling equipment. Here is a wealth of up-to-date useful data not only on jigs and fixtures but also on machine tools, diemaking, plastic molding, welding and allied tools and procedures. A very handy reference for production department personnel as well as toolmakers.

Shows you what powder metallurgy can do for YOU.

Powder Metallurgy

By Paul Schwarzkopf and Associates

The inventor of the multi-carbide hard metals, new sintered iron and steel products, and many of the other powder metallurgical products and processes presents here the first complete explanation of the characteristics, industrial processes, products and underlying theory of metal powders. A wealth of production information and the latest postwar developments are included.

How to get your good ideas into production the best and easiest way.

Simplified Punch and Diemaking

By James Walker and C. C. Taylor

This book by two expert toolmakers gives you the latest information on the methods and materials for the design and construction of all types of punches and dies used for fabricating sheet metal, together with clear how-to-do-it instructions. One tool and die maker of 30 years experience wrote that he found the book so informative and so interesting that he sat up nights reading it! Full reference tables are included.

Increase your production and profits with successful supervision.

Improved Foremanship

By Auren Uris

Conversations between a new foreman and his fellow workers bring out in specific, down-to-earth terms everything that a production supervisor must know to be successful and how he can best learn it. Foremen and top management people alike have put their stamp of hearty approval on this book as one of outstanding helpfulness and benefit to all concerned.

SEE THEM FREE

Use this coupon to get copies of any of these books ON 10 DAYS' APPROVAL. If you are not wholly convinced of their value to you, you may return them without charge.

THE MACMILLAN COMPANY, 60 FIFTH AVE., NEW YORK 11

Please send me on 10 days' approval copies of the books checked at left.

- ☐ Illustrated Jig-Tooling Dictionary ...$7.50
- ☐ Powder Metallurgy $8.00
- ☐ Simplified Punch & Diemaking ...$5.00
- ☐ Improved Foremanship ..$3.50

Signed .....

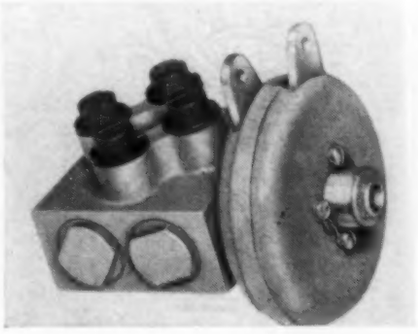
Address .....

.....

Company .....

the belt can safely carry. It is a two-sided joint that permits use of both sides of a belt.

Plategrip fasteners are provided for belts from ¾ to 1½ in. thick. Companion repair plates are also available for repairing tears and cuts or for inserting patches in worn spots.



Selector Valve by Electrol For Manual, Automatic Work

A follow-up selector valve has been developed by Electrol, Inc., Kingston, N. Y., for manual or automatic operation. The valve, which is adaptable to mechanical hydraulic systems for maintaining equal tension, multiple brake actuation, furnace control and other applications, is light in weight and available in sizes to meet specific requirements.

Unbreakable Thermal Oiler For Varied-Type Bearings

An automatic oiler for solid, wick, or waste-packed bearings designed for installation where space between oil hole and machinery is limited is offered by Trico Fuse Mfg. Co., 2948 North 5th St., Milwaukee, Wis. Off-center feed spout makes mounting possible where clearance is as small as ¾ in.

On the slightest temperature rise the oiler discharges a few drops of oil. Feeding stops automatically as the oil cools bearing. The only attention necessary is the refilling of the visible unbreakable plastic reservoir. Sizes available are 1, 2 and 4 oz.

Sherwin-Williams Synthetic Enamel Replaces Porcelain for Some Uses

A synthetic enamel finish which can be used in place of porcelain for many applications has been developed by The Sherwin-Williams Co., Cleveland, Ohio. Called Superclad, the finish is resistant to alkalies and acids. The finish has withstood 5000 hours of humidity test without indi-

PIONEERS IN Modern METHODS OF HEAT TREATMENT

Did you know that

In 1931 after many years of painstaking research, a case hardening process known as "Ni-Carb" was developed and perfected by Mr. Adolph W. Machlet, President of the American Gas Furnace Company. Others call it "dry cyaniding," "carburize-nitriding," or any one of many different names; however, "Ni-Carb" is the name of the original process patented in 1935, Patent No. 1,995,314*. It is the method of heat treating ferrous parts at temperatures ranging between 1375° and 1700° F. in an atmosphere of ammonia and carburizing gas to obtain a hard, wear and corrosive resistant surface with a minimum of distortion and size change. The patent provides that the exact mixture of the gases, the temperature, the time cycle, and other factors may be varied according to surface and core requirements.

The actual treatment can be followed either by cooling in the "Ni-Carb" atmosphere, or by a quench, depending upon the core properties required.

"Ni-CARB"

Here are a few of "Ni-Carb's" many advantages:

1. A tough, hard surface, highly resistant to corrosion and oxidation with no tendency for exfoliation.
2. Distortion is reduced to a minimum, especially where parts are slow cooled in the "Ni-Carb" atmosphere.
3. Can be used on practically any grade of steel, alloy-steels, also on steel castings, cast iron, and malleable iron.
4. It is a gas process and requires no bath such as cyanide or other salts, thus eliminating washing and other attendant disadvantages.
5. Uniformity and duplication of results. No danger or fear of exhaustion of a bath.
6. Economy in processing.

*Other patents bearing on this subject are No. 1,921,128, No. 2,021,072 and No. 2,188,226

For detailed literature covering the "Ni-Carb" process, send coupon below

VISIT A.G.F. AT THE METALS SHOW, BOOTH 1509

AMERICAN GAS FURNACE CO.

1000 LAFAYETTE ST.

ELIZABETH, N. J.

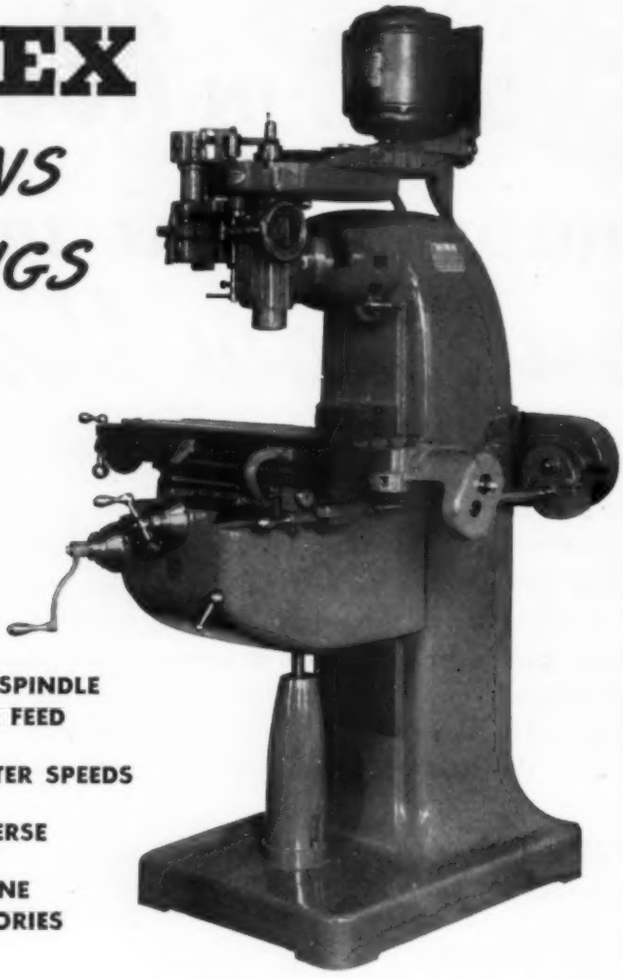
AMERICAN GAS FURNACE COMPANY
1000 Lafayette St., Elizabeth, N. J.
Please send detailed literature on the "Ni-Carb" process.

Name .....
Title .....
Company .....
Address .....

For Tool Room and Production Line

INDEX

MEANS SAVINGS



- **AUTOMATIC SPINDLE AND TABLE FEED**
- **TWELVE CUTTER SPEEDS**
- **RAPID TRAVERSE**
- **COMPLETE LINE OF ACCESSORIES**

Write for Literature or See Your Local Dealer

The Model 50 Index Milling Machine has a greater scope of usefulness than any machine of comparable size or cost, and offers substantial savings in production time and labor. It is tops for general tool room work, including locating and jig work. In addition, the machine's rigidity and freedom from chatter even under severe hogging cuts, plus the ease with which any necessary rate of feed can be obtained, and the rapid traverse for re-positioning, puts this machine definitely on the production line.

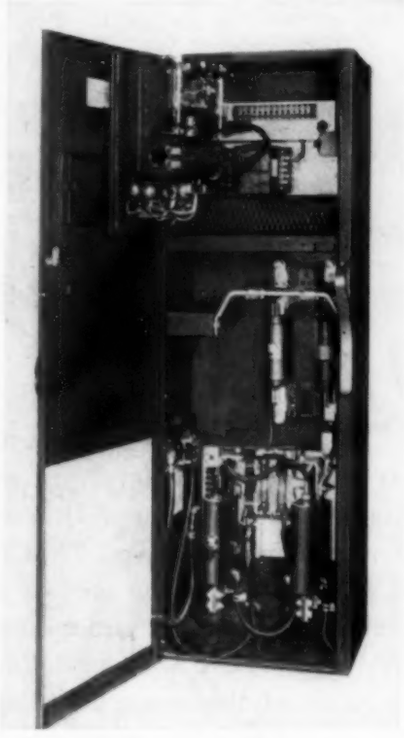
The complete line of accessories available, including end measuring rods, right angle milling head, and both hand and power operated precision rotary tables, further increases the usefulness of this machine.

NOTE: The reliable and time proven Model 40-H Index Mill still is and will continue to be available.

INDEX MACHINE CO.

540 N. MECHANIC STREET JACKSON, MICHIGAN

cation of breakdown and has endured 2000 hours of exposure to salt spray without failure. The coating lends itself to baking with either infrared or convection-type equipment.



Weltronic Control Offered for Spot, Projection, Butt Welders

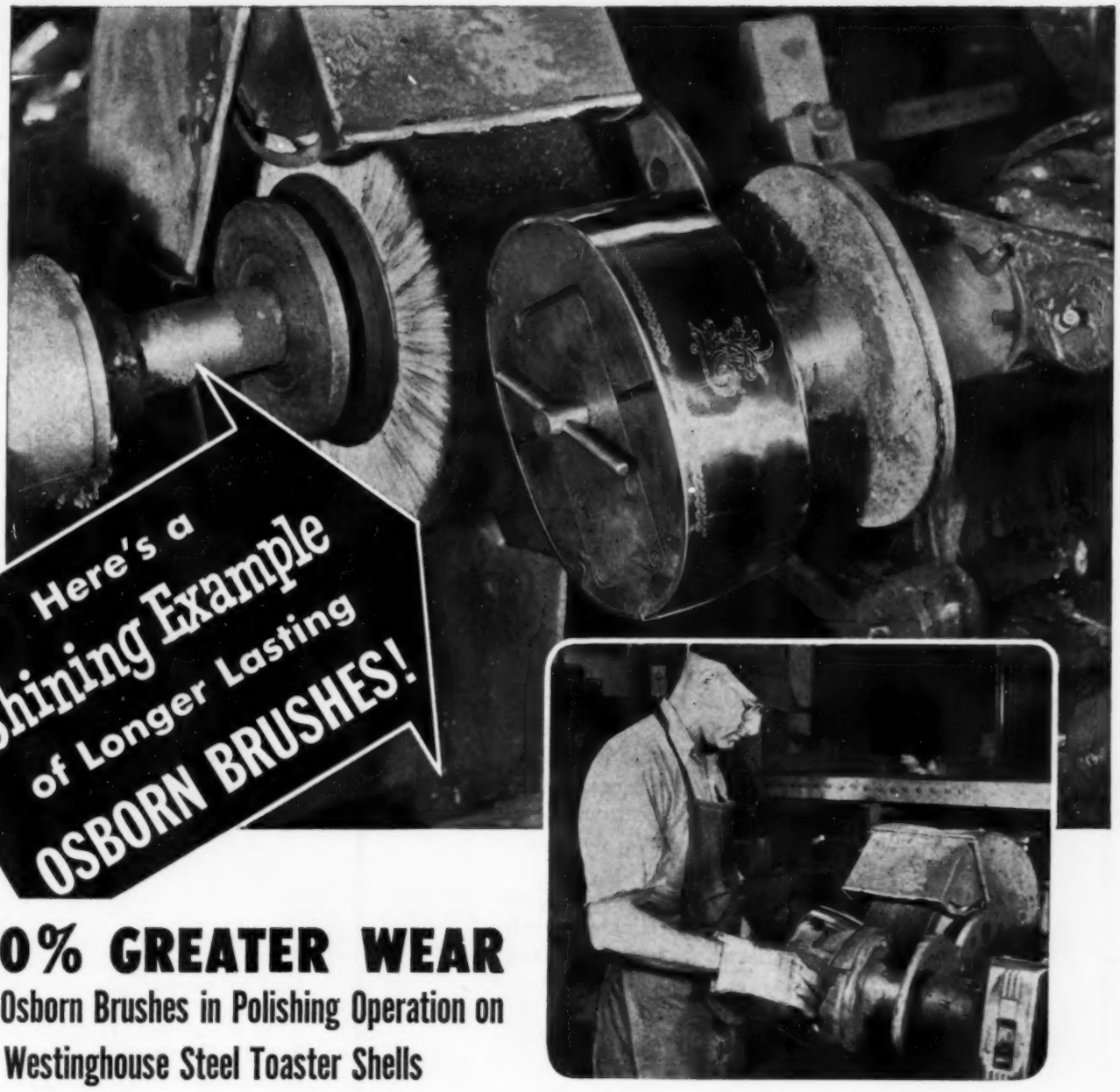
A non-synchronous control combination Series K for foot-operated spot, projection, and butt welders is offered by Weltronic Co., 19420 W. Eight Mile Road, Detroit 19, Mich. The main-line disconnect switch is placed within the unit so that power lines can be brought in directly.

Available in floor, side-of-welder or wall-mounting styles, the cabinet houses a NEMA 1A, 3B or 5B timer, fusible or non-fusible disconnect switch, line fuses and an Ignitron contactor.

Each time period is independently adjustable. Power-supply unit is universal for all timers and operates on 208-, 230-, 380-, 460-, or 575-v. power source. Over-all height is from 48 to 60 in. for the five models offered.

Valvoline Multi-Purpose Grease Offered as a General Lubricant

Valvoline X-5 multi-purpose grease is offered by Freedom-Valvoline Oil Co., Freedom, Pa. X-5 can be used as a general lubricant and changes very little in body up to 400 F. Offering a special metallic soap base, it does not combine with water and is



300% GREATER WEAR

from Osborn Brushes in Polishing Operation on Westinghouse Steel Toaster Shells

HERE'S a typical example of lowered production costs in a power driven brush operation with Osborn Monarch Tampico Brushes.

The Mansfield, Ohio, plant of the Westinghouse Electric Corporation uses power driven equipment in several finishing operations on electric toasters. Marks in cold rolled steel toaster shells, as a result of a previous polishing operation, are removed by Osborn Brushes in *less than a minute.*

This brush, with its thousands of tampico fibre cutting ends, reaches *all* points of the roughened surface and gives a smoother, more lustrous finish than is possible with any other method. The toaster shell is then in an ideal condition for nickel plating.

And outstanding among the many superior features of the Osborn Brushes used on this operation is *far longer* service life . . . *3 times* that of brushes previously used!

If *you* are interested in cutting costs on metal finishing operations, contact us at once. An informed Osborn sales engineer will provide you with factual data applicable to your power brush problems—without obligation.

See Osborn's complete line of industrial brushes at the National Metal Exposition, Oct. 25-29, Philadelphia, Pa., Booth 631

Osborn Brushes

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue Cleveland, Ohio

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY

JOHNSON BRONZE
SLEEVE BEARING HEADQUARTERS

Distributors serve ALL industries 3 ways

YOUR local Distributor of Johnson Bronze provides this valuable three-way service to industry. He maintains complete stocks of Johnson General Purpose Bearings, Universal Bronze Bars and Electric Motor Bearings in a full range of sizes. He is conveniently located in every industrial center from coast to coast, and will make immediate delivery of your every need.

These Johnson Sleeve Bearings and Bronze Bars are the highest quality available, assuring you the utmost in performance and long bearing life. Every bearing is completely machined ready for immediate installation.

Get to know your local Johnson Distributor. You will find his name in the classified section of your telephone book . . . under Bearing Bronze. Phone him today.

JOHNSON BRONZE CO.
515 S. Mill St.,
New Castle, Pa.

water resistant. Valvoline is said to enable equipment to resist rust. X-5 is also said to stay together and does not thin or drip from the bearings.

CA-51 Carbide Sintered Alloy Is Introduced for Planing

A sintered carbide alloy, designed for high-speed planer tools, is announced by Carbide Alloys Div., Allegheny Ludlum Steel Corp., Pittsburgh 22, Pa. Carmet Grade CA-51 is available for planers using either the clamped-in or brazed-type blanks.

A planer with a clamped-in blank removed up to 2100 lb. of metal for grinder tool, cutting a 60% semi-steel casting at a depth up to 1½ in. and at a 175-fpm. surface speed.

BOWED E-RING for accurate positioning of a series of gears and spacers used in counter gear assemblies, is offered by Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N. Y. The Waldes Truarc bowed "E" retaining ring is a three-prong ring bent like a bow out of its plane at about its horizontal center line, to a degree corresponding to the maximum end-play as conditioned by existing tolerances. The bowed ring takes up end play while having sufficient resiliency to permit the gears to turn freely. Both standard and bowed Truarc rings are available in a large range of sizes

Laminated Rubber-Cork Material Controls Vibration and Noise

Elasto-Rib, a laminated rubber-cork material for vibration and noise control, is offered by the Korfund Co., Inc., 48-15 32nd Place, Long Island City 1, N. Y. The material is composed of a layer of cork bonded between two layers of deep-grooved oil-resistant synthetic rubber.

The ribbed contour of the rubber increases the isolation properties and forms a non-skid contact with the

DEFIANCE *means Accuracy*

in BORING . . MILLING . . DRILLING . . TAPPING

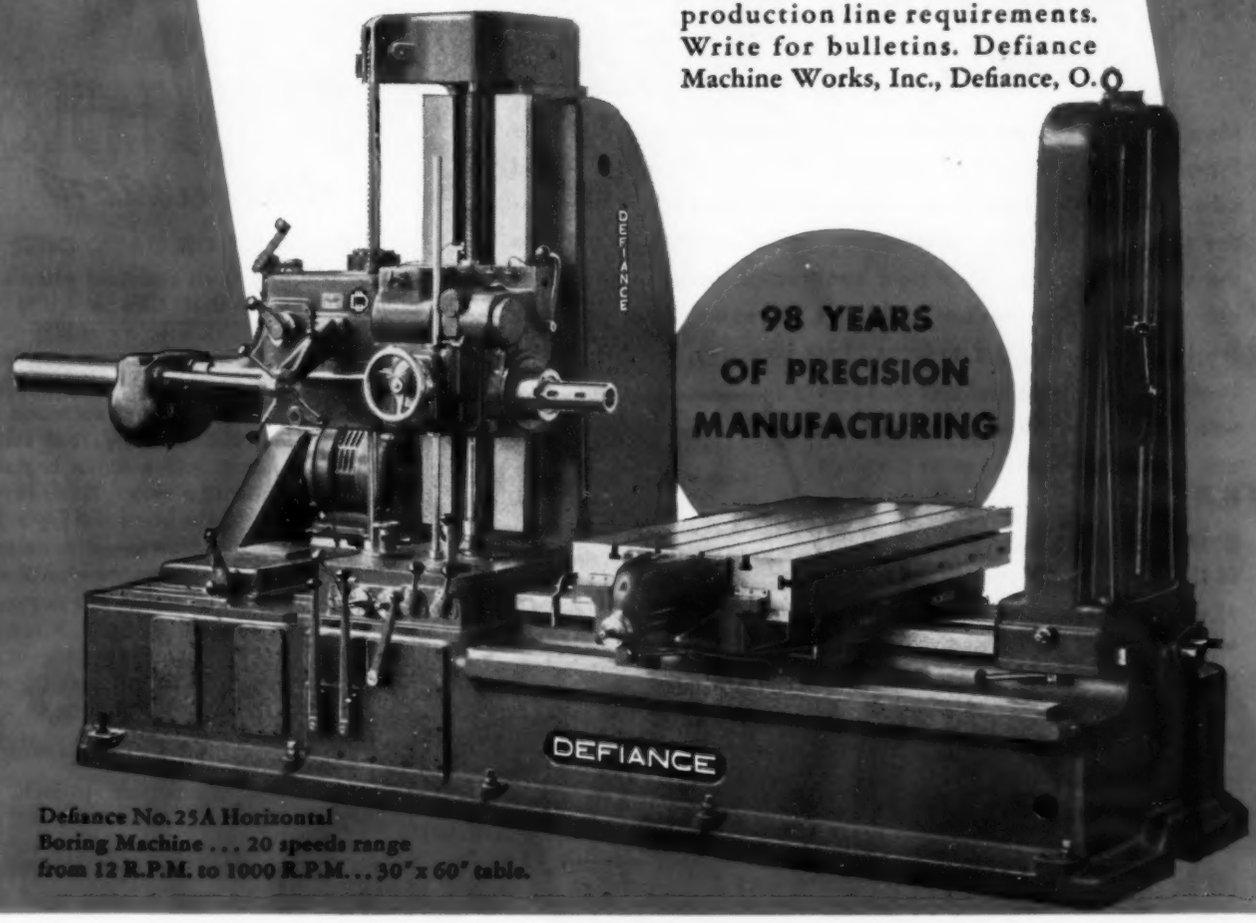
Here's Why—

EXTRA RIGID! Built oversize with wide outboard supports (48") to handle overhanging work with precision. Bed scientifically ribbed for maximum rigidity . . . extra strength.

WIDE RANGE OF SPEED! Adjustable from 4 R.P.M. to 1000 R.P.M. . . . enables operator to use most efficient tools for each job.

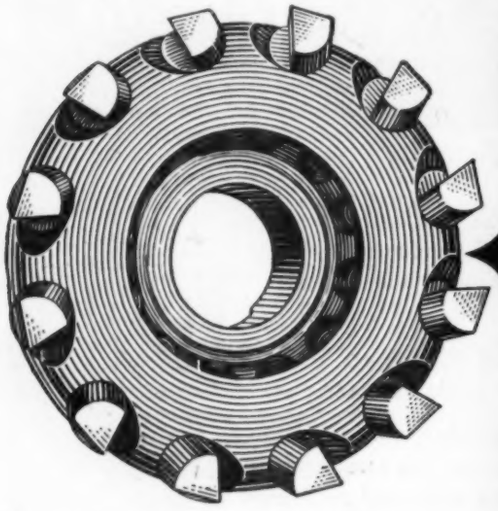
ADAPTABLE TO MANY USES! Special equipment available includes . . . auxiliary tables, hand and power fed; vernier attachments for column and table; dial indicating attachment with end measures for column and table; facing heads and newly announced Universal Milling attachment.

DURABLE! You can't beat Defiance Boring Mills for day-in and day-out dependability. Simple in design . . . trouble-free performance . . . ideal for your tool room or production line requirements. Write for bulletins. Defiance Machine Works, Inc., Defiance, O.



Defiance No. 25A Horizontal Boring Machine . . . 20 speeds range from 12 R.P.M. to 1000 R.P.M. . . 30" x 60" table.

MODERNIZE WITH CARBIDE



ANY OF THESE BLADES* WILL FIT ANY LOVEJOY STANDARD 4½"-24" DIA. TYPE "A" CUTTER EVER BUILT!

More proof of Lovejoy Milling Cutter economy. Even if you have Type "A" mills that are 30 years old, you can utilize them to full advantage with carbide tipped blades with either positive or negative rake. The housings, whether 4½" to 24" in diameter, all take the same blade size. Their rigid construction permits the use of only ½ the regular number of blades, increasing chip load with low H.P. Thus you need no large blade inventory, but can rely on Lovejoy's large stock and prompt delivery with tips of any standard grade. You can, of course, use these same housings for standard H.S.S. or cast alloy blades —here too a single blade size will fit the complete range.

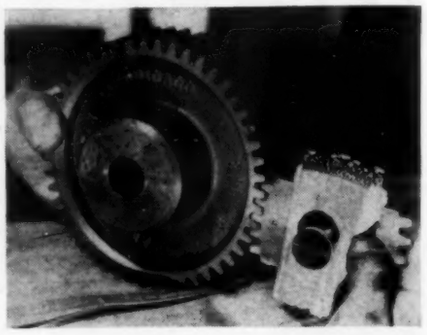
*A single size of H.S.S. and cast alloy blades will also fit every housing size.

"TOOL BITS"

Modern shop technique often calls for milling cutters with negative rake blades. Although certain phases of this technique are standardized, new discoveries on speeds, feeds, rake angles, etc. are being discovered regularly. Lovejoy is in constant touch with these new developments, both through their own experiments and through reports from production plants in all parts of the country. Lovejoy will be pleased to supply any information in its files and all newly acquired data. When inquiring, please give details on machine, material to be cut, etc.

Lovejoy
TOOL COMPANY, INC.
SPRINGFIELD, VERMONT

floor. Elasto-Rib is now available in 1 in. thick sheets up to 24x36 in. in size. Recommended loading is between 7 and 21 psi.



Gear Gage by George Scherr Made with 20° Pressure Angle

A gear gage made of stainless steel with a 20° pressure angle full-length tooth form 3-4-5-6-8-10-12-16-20-24-32-48 and stub tooth forms ¾-4/5- 5/7- 6/8- 8/10- 10/12- 12/14-16/21- 20/26- 24/32- 32/42- 48/64, is manufactured and distributed by the George Scherr Co., 200 Lafayette St., New York 12, N. Y. Gages are used for a quick check of gears. The gage eliminates the need of calculation and computation to determine the pitch of a gear with an unknown pitch.

ROUND TABLE *Discussion*

BACK UP OR BACK OUT?

The training of an assistant when one is not given that title is quite an undertaking. This is especially true today in the Union-controlled shop.

Many companies profess to having the policy of training someone to take a supervisor's place. Yet many times no constructive move is made to help open the way. How can a man hope to train someone for a job if the company frowns on assistants and will not allow anyone else to run the department except the foreman or his immediate superior? What incentive has the worker who is on the other side of this industrial fence, if he can never get a chance to lead men, direct them as a foreman would in carrying out his job?

Industrial companies preach, as they should do, that no man can advance if he does not have someone capable of taking his place. This is very true, because a man who def-

Available in Grades to suit your needs

Allegheny Ludlum High Speed Drill Rod in these specially-processed smaller sizes is available to you in all types of High Speed Steels, as well as high carbon-high chrome Die Steel types. You can get the *grade* you're used to, plus better results—why not investigate its possibilities?

Address Dept. AM-78

Do you use High Speed Drill Rod in the smaller sizes? If so, here's an Allegheny Ludlum development that you can translate into real advantages —longer tool life, better performance, greater production.

A-L now *hot-draws* these small sizes by a special process, instead of cold-drawing with its repeated passes and anneals—each of which takes something out of the steel. The result is: a high degree of hardness, obtained with fine grain size, and with small, evenly distributed carbides for keen cutting edges; plus maximum toughness in the hardened and tempered condition.

By actual test, ⅛" *hot drawn* High Speed Drill Rod at 64 Rockwell C is as much as 18% *tougher* than cold drawn at the same hardness. ● But the best test is to *try* this Drill Rod—*prove* its merits for yourself. Check with your local Allegheny Ludlum Branch Office or distributor.

ALLEGHENY LUDLUM
STEEL CORPORATION
Pittsburgh, Pa.

TOOL STEEL DIVISION: DUNKIRK, N. Y.

Fine Tool Steels Since 1854

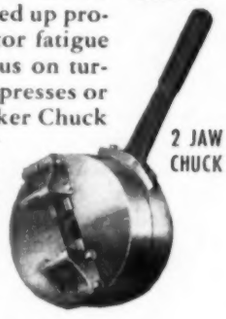
AL

W&D 1778

Barker Two-Jaw or Three-Jaw WRENCHLESS CHUCK

Will pay for itself in 60 to 90 days on production schedules by giving MORE parts per hour at a LOWER cost per part. Most round parts can be set in the Barker Wrenchless Chuck without stopping the machine. It saves time, helps speed up production, is simple to operate, reduces operator fatigue and cuts spoilage where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine. The Barker Chuck shown above, replacing an ordinary 3-jaw chuck, jumped production from 18 to 24 pieces per hour. It can do it in *your* plant too. Let us show you how!

Write for bulletin 201 today.



—Chuck Division
THOMAS HOIST CO.
22 S. HOYNE CHICAGO 12

initely keeps his job as a one-man affair will never advance. How can he? The company learns that this man knows only one thing, his own particular job, that he is often narrow-minded and all too frequently has acquired the attitude that he is indispensable. This man is definitely destroying company morale and if he will not mend his ways, should be fired.

By all means try to select someone under your supervision who can adequately handle at least some phase of your job. In some instances, such as certain types of engineering positions, the work is specialized and must be broadened out to have two or three men learn the details and work together to produce the same effect as one specialized man might be doing.

Foremen should find men in their departments who are interested in advancing and school them—regardless of any comments that may be made in the shop. Management should take a hand, stop talking and do some acting to assist in this problem. For it is from the rank and file that many future management men will come.

Foremen must pick capable men—not by seniority but by their ability to serve later as members of management. Seniority does not necessarily build better shop morale. It merely keeps the remarks of the Union under cover. Almost every man, given a goal, will strive to reach it. Each man within an organization has his chance to become potential management timber. Companies should grow from within. Train your man to do your job, and you leave your own way open for advancement for yourself.

Chas. D. Townsend
Centralia, Mo.

•

Whether an executive should, even tentatively, prepare a possible successor is a debatable point. The word "possible" is here used advisedly, since there may be others, higher up than Al, interested in the same problem, not necessarily or, indeed, exclusively in the best interests of the company. Regarded in that light, there could be more in Ed's jibe (about Al sticking out his neck) than meets the eye. So much depends on circumstances, such as the size of the company and the record of the bosses in the matter of fair dealing and recognition of proven worth.

If the company is a large one where chances of promotion are fairly numerous, and if a reasonable proportion of executive appointments is made in recognition of general merit,

Best Deal For Long Wearing, Better Looking Uniforms

REEVES ARMY TWILL

The Reeves fabrics in the designs shown were recently publicized in LOOK Magazine. Designs are by Helen Cookman. Patents applied for.

LONG-LASTING economy is "in the cards" when you specify Reeves Army Twill for your industrial uniforms. The high tensile strength of this top-quality fabric assures years of rugged wear.

Reeves Army Twill tailors beautifully—which means better employee appearance, greater comfort. These are important assets towards boosting employee morale and increasing public good will.

Reeves Army Twill comes in a wide range of vat-dyed colors fast to sun, water and perspiration. It withstands repeated washings . . . its residual shrinkage is less than 1%. Remember—over 90 million yards of this same fabric helped equip America's fighting men—exceeded Government specifications under the toughest climatic conditions.

SPINNING · WEAVING · DYEING · FINISHING
Reeves FABRICS

"FROM COTTON TO CUTTER"

THE REEVES FABRIC GROUP INCLUDES: Reeves Army Twill · Reeveking Gabardine · Glengarrie Poplin Marine Herringbone · Byrd Cloth · Warrior Twill Mountain Cloth · Pima King Broadcloth · Chesnee Gabardine · Reevecord · Parklyn Pique

MADE OF FINE COTTONS

REEVES BROTHERS, INC.

54 WORTH STREET, NEW YORK 13, N. Y.

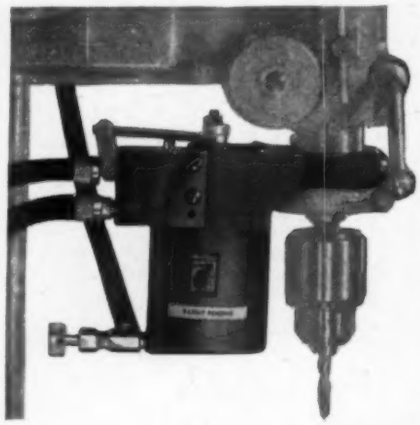
REPRESENTATIVES IN: *Akron · Atlanta · Boston · Chicago · Dallas · Los Angeles · Philadelphia · Portland, Oregon · St. Louis · Montreal · Toronto*

Dual-purpose Pneumatic

DRILL PRESS FEED

for drilling, reaming, tapping, etc.

This simple, inexpensive device quickly converts standard drill presses into semi-automatic machines—increases production, reduces operator fatigue, and does a more uniform job.



Clamps to spindle quill in a few seconds. Automatically closes air fixture on work. Adjustable feed control and break - through cushion. Quick return. Easy to synchronize with automatic cycle equipment.

Air-Power does it quicker, cleaner, better. Write today for latest complete catalog.

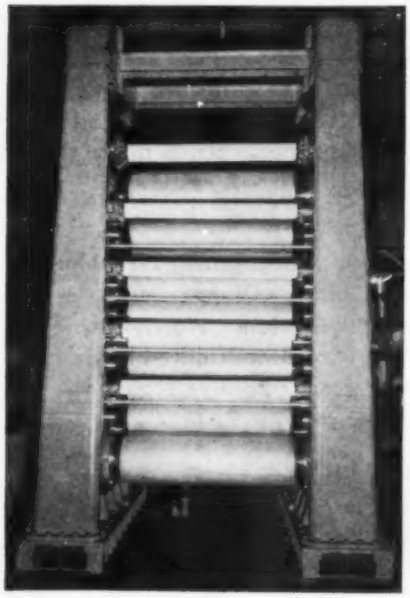
MEAD

SPECIALTIES COMPANY

4114 No. Knox Avenue, Dept. MA-108, Chicago 41, Ill.

SPEED TREAT – free machining steel withstands hundreds of tons pressure

Since 1935 *Speed Treat* (.45% Carbon) Steel has been a standard specification on Appleton Super-Calender Rolls manufactured by the Appleton Machine Co., Appleton, Wisconsin. These rolls are produced by subjecting thousands of paper or cotton segments to pressures exceeding 1000 tons. Speed Treat Collars and nuts up to 24" diameter and 4½" thick are used to lock the compressed filler on the shaft. This customer writes, "Uniformity of structure and strength, coupled with ease of machining, are among the leading qualifications which have recommended the continued and desirable use of Speed Treat Steel."



For complete information on free-machining Speed Treat or Speed Case Steel Plates, write today.

W. J. HOLLIDAY & CO., INC.

Speed Case - Speed Treat Plate Division

HAMMOND INDIANA

Plants at Hammond and Indianapolis

SPEED CASE — SPEED TREAT WAREHOUSE DISTRIBUTORS

Beals, McCarthy & Rogers, Inc., Buffalo
Brown-Wales Co., Boston
The Burger Iron Co., Akron
Grammer, Dempsey & Hudson, Inc., Newark
Earle M. Jorgensen Co., Houston, Los Angeles, Oakland
Peninsular Steel Co., Detroit
Pidgeon-Thomas Iron Co., Memphis
Horace T. Potts Co., Philadelphia

SPEED CASE®
Low Carbon
SPEED TREAT®
Medium Carbon
Open Hearth • Free Machining
STEEL PLATES

W. J. HOLLIDAY & CO. 92 YEARS of STEEL

the sensible course for a responsible executive to follow is so to organize his sections that they will function efficiently in his absence. Discriminating, considerate bosses—not the selfish bluffers with the personal pronoun—ever on their lips—value an assistant who can plan and organize.

The ambitious, capable executive with a flair for planning and organizing will, naturally, gather round him the best men he can get hold of and, as like draws like, he will encourage and advance those of high potential and initiative, to the limit of his authority. If he is sure of himself, he will do so without misgiving in the matter of whether he may be running the risk of undermining his own position.

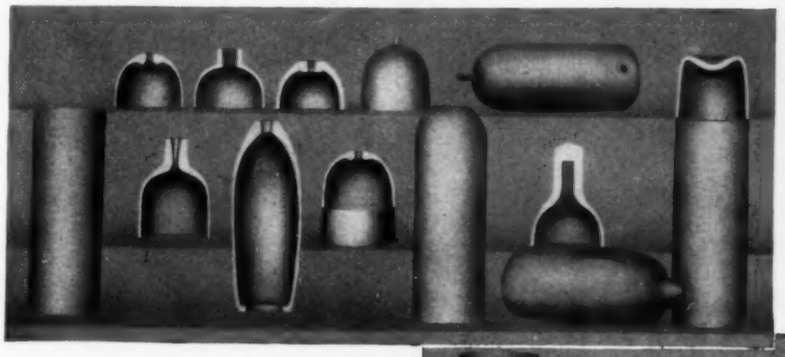
In the small company, with its limited opportunities for advancement, there *can* be a temptation to keep things under one's hat. Even so, such conduct is wrong and short-sighted, just as getting rid of a really good executive for no other reason than to replace him with a good and possibly lower-paid number two would be deplorably wrong on the part of a boss. Happily, such yellowness is not common in modern industrial bosses.

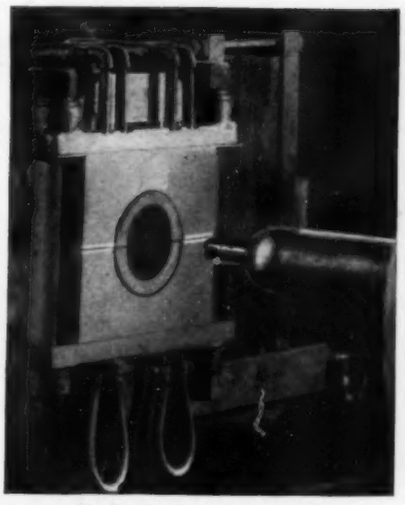
If in order to feed his vanity or in fear of one day being replaced, a responsible executive makes a point of employing only second-rate yes men, devoid of initiative or ambition, he may thereby, for a time, insure himself against unemployment. He will also have to his debit a department that won't function properly in his absence, through lack of a good second string. Such a man can hardly complain if he is continually passed over in the matter of promotion. Other things being equal, a boss is more likely to advance a man whose section can be expected to run reasonably well while a promoted number two gets properly run in. In the matter of promoting within the company, it is obviously good business to make moves that will cause the minimum of upset.

It is the writer's experience that seniority does not normally build morale. Good leadership will do that and leaders are born rather than trained. Training will improve the quality of leadership but only if the potential is there.

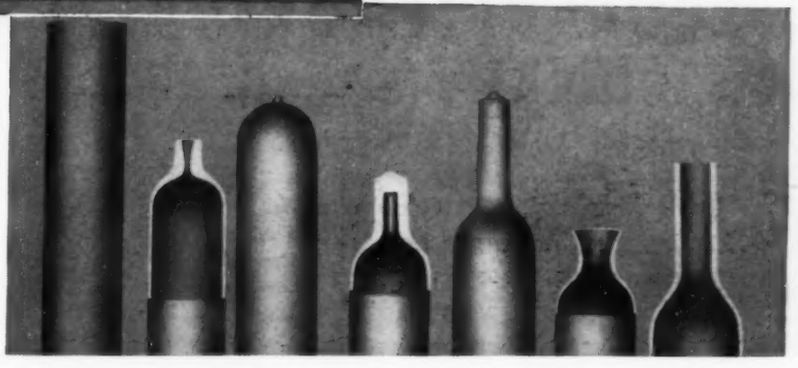
The boy who never displays a talent for leadership is unlikely in later years to be a leader of men. The man of promise, with potentialities, is usually possessed of moral courage and a high sense of duty, such a man will incline to leadership or management by example, than which, there is no better builder of morale. Mere

Federal announces "THE WESTIN PROCESS"





PATENTED



HERE'S a really new way to form tubular sections. Far more efficient than conventional methods in use today, the revolutionary Westin Process is performed by a combination of electrical current and pressure. Its application means considerable savings in time and material, and a greatly improved product quality.

Developed to enable manufacturers to achieve lower unit cost of production, this new process is particularly adaptable to forming steel gas cylinders, upsetting sections of tubing to increase wall thickness, sealing tube ends, necking-down tube sections and performing other high-production operations of a related nature on low carbon, alloy steel, brass and other metals.

The Westin Process is one more example of how Federal is making every effort to reduce costs and increase production and quality in the metal working field.

When forming tubular sections, it will pay to look into the Westin Process. The illustrations on this page are intended only to set you to thinking about your own production. It costs nothing to inquire.

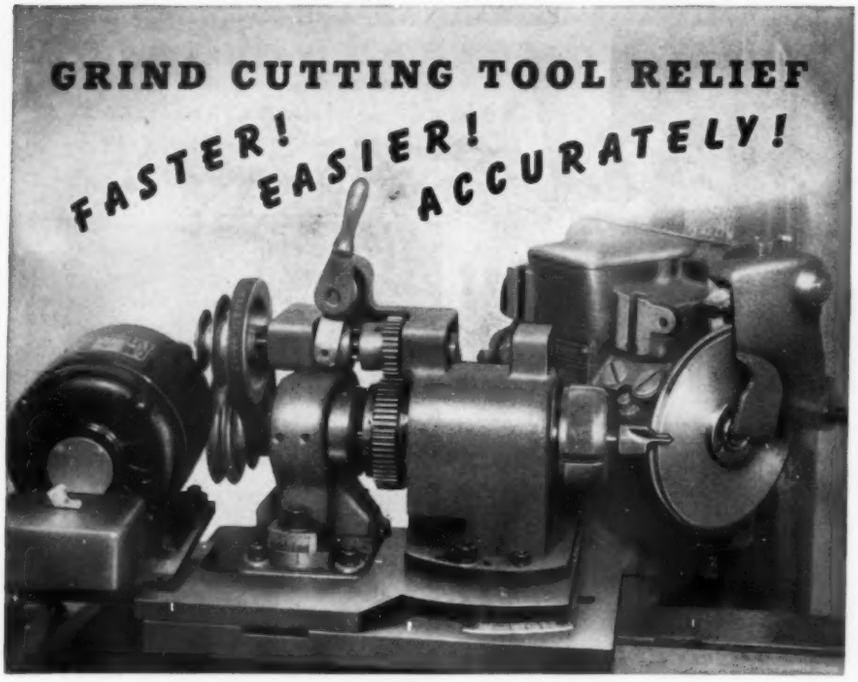
Federal is equipped to handle every type of metal forming or resistance welding application. Let our engineers analyze your product and show you new economies in your press and welding operations.

Federal WELDERS

Warco PRESSES

RESISTANCE WELDERS FOR EVERY APPLICATION
FROM 50-TON OBI TO 2000-TON DOUBLE ACTION

THE FEDERAL MACHINE AND WELDER COMPANY
Dept. 1108-B Plant 2, Warren, Ohio • • *Offices in Principal Cities*



WITH THE

CIRCULARITY-GRINDING ATTACHMENT

for

- ★ **Form Relief — Radial Relief — Form and Radial together — Straight and Tapered Cylindrical Grinding**
- ★ **Easily mounted on all Universal and Cutter Grinders**
- ★ **Work held between dead centers or in collet**
- ★ **No special cams or fixtures needed for any set-up**

DEVELOPED by the Detroit Reamer & Tool Company, the Circularity-Grinding Attachment has been used successfully for several years in the manufacture and reworking of cutting tools. Form relief, radial relief, form and radial relief together, straight and tapered cylindrical work all may be accurately ground with this attachment . . . thus in many cases it replaces a motor-driven headstock.

The work may be held in a collet (0" to 1¼") or between dead centers. In either case the work always revolves on its own axial center. Set-ups are simple and the Circularity-Grinding Attachment provides identical relief on every tool ground from the same set-up.

Send for our new illustrated bulletin which gives complete explanation of set-up and operation of the Attachment. Write today.

D R & T COMPANY

DETROIT REAMER & TOOL CO.

Mfrs. of Special High Speed Cutting Tools

2830 East 7 Mile Rd. Detroit 12, Michigan

seniority does not confer those qualities on man or woman.

C. D. Mackinnon
Airdrie, Scotland

•

IS BLUE MONDAY INEVITABLE?

Hurrah! Al's hour of grace is surely a bull point. If, further, this hour for gas, gossip and supervisory ineptitude could be extended to railway, buses, trains, and all public-service personnel, to shops and stores, if the housewife could bring forward the hour of her proverbial—possibly mythical—gossip over the garden fence, the entire business could be regularized and standardized. It might even be considered whether or not it would be worth while emulating Joshua and commanding the sun to stand still. What a prospect for the visionary!

True, this may be putting the cart before the horse; to put slackness before serious business instead of the reverse but, if the world is to become topsyturvy in character, would this very much matter? It may be that we should end as we began. One could imagine Alice in Wonderland saying "curiouser and curiouser."

P. E. James
Lindum, England

•

DEADLINE OR DEAD TIME?

From personal experience and common shop knowledge, I believe that a "clean-up" allowance is not lost time, but an intelligent, commonsense and effective means for improving working efficiency. When the men are given an absolute deadline, a few minutes earlier than their regular quitting time, and know that they are expected to work to that deadline and not quit a minute before, the few minutes they are allowed to coast will be found to be compensated for by an eventual increase in work.

From a practical standpoint, every shop foreman knows that there is a certain letdown among most of the men when it gets near quitting time. At the prevailing hourly wage rates, the productive time lost when a deadline is not established may run high. One person, inclined to slow up earlier, is likely to influence others, and the amount of stalling at the end of the day becomes uncontrolled. Fixing an allowance for cleaning up is a wise psychological move which not only recognizes the reasonableness for satisfying the human need for a final respite at the end of a day's work but also indicates

Announcing A BASIC DESIGN IMPROVEMENT

in the New Gorton *RATIOBAR 3-Dimensional Pantograph for Light Milling and Engraving

This revolutionary machine features the new and exclusive *RATIOBAR Tracer Control — the first basic design improvement in pantograph construction since the first pantograph was built.

Manufacturers of small intricate dies, molds, hobs, stamps and other related products placed firm orders sufficient to take all of the first production run after inspecting the pilot model—real proof of the value built into the P13.

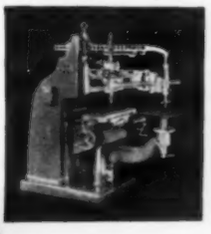
What is *RATIOBAR tracer Control?

*RATIOBAR Tracer Control is the name for the newly developed principal of control, found only on the Gorton P13. It does three important things: permanently aligns the pivot center, cutter spindle and tracing style in an absolute straight line without guessing or innumerable adjustments; enables the operator to set reduction ratios with just one slider block; it provides rigid support for all pantograph linkages. No other manufacturer offers these advantages in a pantograph.

Easier operation and better balance are also assured with the *RATIOBAR because linkages move toward the pivot center as the tracer moves out and away from it. For detailed information, use the coupon below.

OTHER MODELS FOR OTHER WORK

The new Gorton P13 is just one of a family of cost-cutting, precision pantographs. Your requirements may call for the 3-L — largest 3-Dimensional Pantograph available today, the 3-U or 3-Z for light or medium milling and engraving in 2 dimensions, or you may require special adaptations or tooling. Our Engineering Service is ready to serve you without obligation.



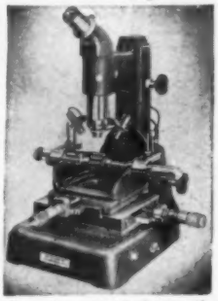
FREE . . . COMPLETE INFORMATION
Here's complete data on the new Gorton P13 as well as other Gorton pantographs. Use this coupon or write for Bulletin 1580 today — it will pay you well.

GEORGE GORTON MACHINE CO.
1310 RACINE STREET, RACINE, WISCONSIN, U. S. A.

PLEASE SEND WITHOUT OBLIGATION
Bulletin No. 1655-1510
Name.....
Company.....
Position.....
Address.....
City.....State.....

SCHERR *aids to precision – production*

Low-Priced and Practical Toolmakers Microscope—The WILDER



Here it is at last—a precision checking tool that every shop needs, at a price that any shop can afford. Measures two ways with micrometer to .0005, or with gage blocks for closer accuracy. The image is on a clear glass reticule for maximum definition. Has understage lighting for shadow image, and surface lighting for reflected image. An essential instrument in today's precision demands, at a most interesting price. Write.

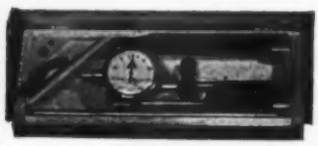
Gears have no secrets from the PARKSON GEAR TESTER *Tests gears in mesh*

Locates distance, center to center, at which gears run best. Measures backlash, reveals any pitch line eccentricity, thick teeth, spacing errors, off-center teeth, burrs. Registers deviation on dial indicator in .0005". With autograph Recording device (for spurs and helicals only) makes permanent records on waxed discs, which can be kept for reference on gear quality. Capacity, 9" between centers. Other models to 36". For all types of gears. A valuable, trouble-saving tool, widely used wherever gears are made.

Get low-cost precision with Ultra-Chex Gage-Blocks

The last word in modern basic accuracy brought within the grasp of all shops large and small. Sets in size for all budgets. All blocks accurate to five millionths. Illustrated is the 34-block set, giving 80,000 combinations in steps of 1/10,000", with optical flat for checking wear. Low prices allow for constant practical shop use in setting tools, checking gages, locating holes in jigs and fixtures, etc. Many shops use a number of sets, with one master set for reference. Set shown, $125.

There's enduring accuracy in SCHERR DIAL INDICATORS



Last longer and cost less. Have an exclusive mechanism of extra sturdiness, with only three moving parts. No quick spinning wheels or unhardened racks. Furnished with standard back or with ball-joint back for setting at any angle. Contact points for all needs. With clamp holder, extension bar, tool-post holder, in compact metal case. Indicator Only $10. Complete set with universal attachments, $19.75.

Write for full details on these tools

GEO. SCHERR CO., Inc.
[illegible] St. New York 12, N. Y.

to the worker that the foreman is an understanding man who merits their utmost cooperation and productivity.

Harry Kaufman
Philadelphia, Pa.

•

SINGLE TRACK OR DOULE-TRACK MIND?

A storekeeping system that was put into operation in a very large plant about 45 years ago, is I believe, really good.

Every machinist was supplied with 12 tool checks, each check having his individual check number stamped on it. If he damaged, broke or lost the tool, he could not get his check back without receiving an order from his foreman. This kept the foreman acquainted with all the tool breakages or damages, and who was responsible for them. An inspector, a competent toolmaker, was constantly employed in the tool crib, but was held responsible to the toolroom superintendent. He checked every tool and laid aside any that might need repairing. If a man left the concern for any reason, he could not get clearance or any salary due him until he had returned all 12 checks to the storeroom.

These conditions made men careful of tools used, thereby keeping breakage and repair to a minimum.

I do not believe that any one man can competently keep track of, and repair all of the tools turned in. He would eventually have time only to see that tools were returned, not time enough to see that they were also in good condition. If the company can employ only one cribman, it would be more economical to give the job to a machinist—preferably a toolmaker.

Arthur Silvester
Niantic, Conn.

•

BLUE DEVILS

Blue Devils? Most certainly there are Blue Devils! Those little industrial demons are cousins to the aerial variety known as Gremlins. Maybe you don't know it, Ed, but what do you think were perched on your shoulders the day you broke that cutting-off tool right under the boss' nose? Of course the Bull was in a hurry for the job, but the fact that you splashed up his inquisitive face a bit with cutting compound didn't contribute any toward a gold star on your progress report.

Ordinarily, Blue Devils are harmless critters; they're like destructive germs—as long as we have the proper resistance to combat their destruc-

Our CENTERLESS GRINDING Saves You Money!

Centerless grinding is a good example of the way BUERK TOOL WORKS can save you money in the machine shop. Turning out grinding work three or four times as fast as ordinary grinding methods, our centerless grinder gives you high-volume production on any parts sent to us for this operation. We suggest it, too, as a money-saving "plus" value in the *complete* shop service we offer on jigs, fixtures and machine parts.

Send us your prints or write for complete information — today!

BUERK TOOL WORKS
MEMBER NAT'L. TOOL & DIE MFRS.' ASSN.
307 Grote Street Buffalo 7, N. Y.

LAYOUT FLUID

Send for Your FREE Sample

For Machinists, Toolmakers, Diemakers, Model Makers, Template Makers and Layout Men—also for general machine shop and toolroom use on tools, dies, jigs and fixtures and machine surfaces, this Layout Fluid has a considerable advantage over the old copper sulphate method.

With the use of this Layout Fluid, you simply wipe the surface clean and brush it on. It dries instantly.

SEND FOR YOUR FREE SAMPLE of this Combination Brush-in-can. Please use your letterhead.

DAYTON ROGERS MFG. CO.
Minneapolis 7, Minnesota

WANT TO DOUBLE PRODUCTION WITHOUT COSTLY EXPANSION?

Air Power Can Help You

Yes, it is a fact that you can increase, even double, production of many of your machines without making costly changes or expanding your plant . . . if you apply the proper Schrader Air Cylinders and Operating Valves to existing equipment. Schrader Air Cylinders eliminate slow manual operations. Operators work with greater speed and safety. They do not tire when Air Power takes over the hard jobs. Every application for air cylinders requires the use of operating valves. Schrader not only supplies types and sizes of cylinders for all purposes but a complete range of air valves—hand, foot, or pilot-operated. Get the story on Schrader Air Cylinders and Valves at once. And choose all other accessories from the Schrader family of air control products—the world's most complete line.

FREE Get your copy of this information-packed 8 Page Booklet describing Schrader Air Control Products.

Schrader
PRODUCTS
CONTROL THE AIR

A. SCHRADER'S SON, 490 Vanderbilt Avenue
Brooklyn 17, N. Y., Dept. AMO11
Division of Scovill Manufacturing Company, Incorporated

Please send me your FREE BULLETIN and more information about the products I have checked in circles below:

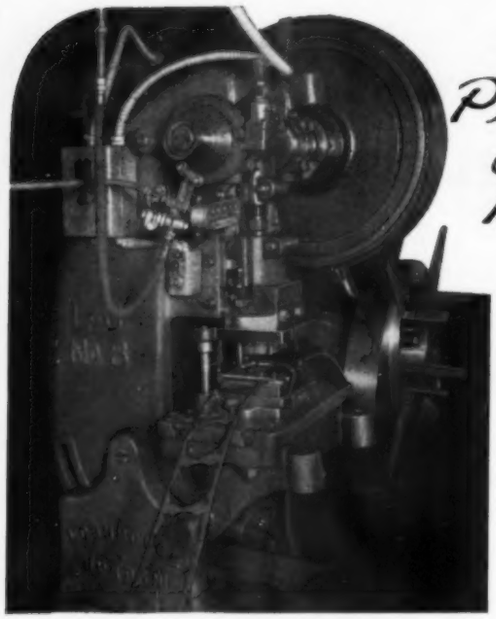
Name_____

Company_____

Address_____

City_____ State_____

○ *Air Cylinders*	○ *Air Hose & Fittings*
○ *Air Valves*	○ *Hose Reels*
○ *Press Controls*	○ *Hydraulic Gauges*
○ *Air Ejection Sets*	○ *Air Pressure Regulators*
○ *Blow Guns*	○ *Air Line Couplers*



Picture OF AN L & J PRESS *MAKING MONEY*

In continuous use 15 years, record sheet shows less than 50 cents per month for repairs. Paid for itself in a few months. Exceptional? No, it's commonplace with L & J Presses. Alert to the needs of industry for 38 years, L & J Presses today provide the ultimate in long service, short down time, low maintenance costs. Available 6 to 79 Tons capacity. Back geared and plain Flywheel type. Send for catalog.

Dependable L & J Sales Engineers at Your Service

STANDARD SINCE 1911

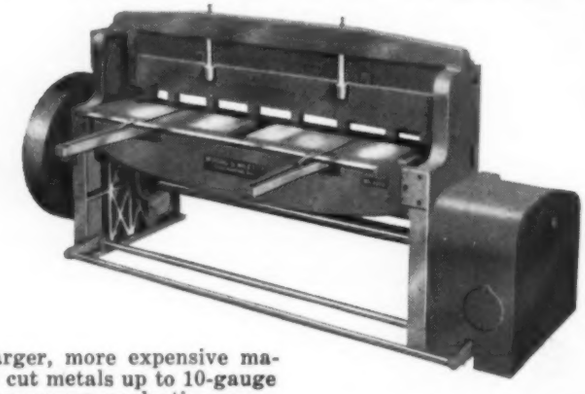
L & J PRESS CORP.

SUCCESSORS TO LOSHBOUGH JORDAN TOOL & MACHINE CO

1629 STERLING AVE. *Elkhart, Ind.*

SPEED PRODUCTION, CUT OVERHEAD

with Wysong and Miles Power Squaring Shears



Using larger, more expensive machines to cut metals up to 10-gauge adds unnecessary production overhead. The Wysong and Miles 10 Gauge Shears, 6 foot and 8 foot in width, can do much of the work you are now routing to larger machines.

That's one reason the Wysong and Miles 10 Gauge squaring shears are ideal auxiliary machines. Relatively inexpensive, in both initial investment and operating costs, they are precision machines with an accent on accuracy and speed.

An important feature is the compensating holddown, with a spring actuated plunger in each foot. Even small strips are clamped firmly without adjustment.

The ball-bearing back gauge is set by a handwheel dial reading, adjustable to .0078 (1/128th) of an inch. Taper shearing is easily accomplished.

Another feature is the jaw-type clutch, so simple in design and operation that it requires only periodic lubrication. For safety and convenience, a non-repeat unit can be set to stop shearing action after each stroke.

Take time now to write for full information about the complete Wysong and Miles line of power squaring shears and other sheet metal machines. **WYSONG AND MILES COMPANY, 623 FULTON STREET, GREENSBORO, NORTH CAROLINA**

tive efforts, we neutralize their evil effects. Occasionally, the little varmints gang up on a guy and all Hell breaks loose—the poor guy is done for the day. Blue Devils are unwelcome visitors without visas; these invisible phychological undergrounders play no favorites; their mission is decidedly subversive, yet they do not get their orders from Moscow. Their one virtue is the tendency to iron out a person's wrinkled ego—when a guy feels that he is just too good and is about to put the bee on the boss for an hourly touch, the rectifying Blue Devils will call a meeting and decide that it is high time to get the fellow back on the beam.

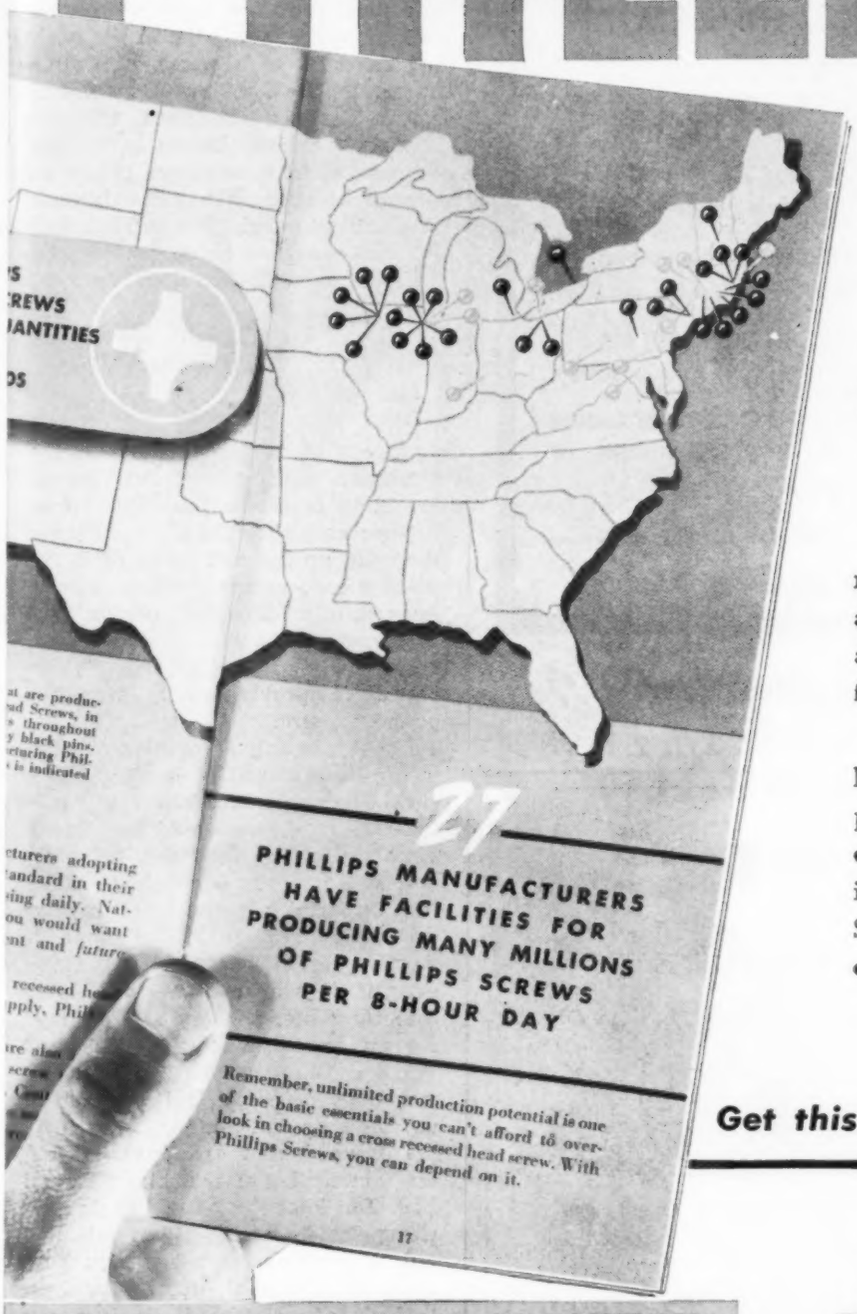
While I have suffered their annoying raids many, many times and have slammed the lid of my toolbox in my desperation, convinced that further efforts were decidedly futile, I never could understand what it was that was hounding me until I ran into a Blue Devil fighter of the first rank. During the busy days of the War-to-end-wars I met up with Pierre McGillicuddy, a black-eyed French Canadian, who was one of my best workmen. Pierre operated the hydraulic press which nosed the shell blank.

One day, when production was practically singing along at its best, I heard a blood-curdling howl of human distress, followed by some of the most-highly seasoned outbursts of sulphuric profanity, coming from the smoke-laden forge room. A few seconds later Pierre kicked his way through the confining door, carrying a red-nosed, smoking shell on the end of a pair of tongs, and made straight for me. Such a look of distress and intense fear on the man's face I've never seen since.

"Check! Check!" (that's F-C for Jack) Pierre stormed like a pop-off valve on a locomotive. "Dees ez ze eight like deez I make—look at ze nose on heem!" "Well," I replied with that imperturbability always displayed by well-controlled executives, "maybe you ran your heat too far, Pierre." He shoved the mutilated shell up to my nose—very nearly singeing my moustache—and replied. "Heat my cockeyed seestaire," he stormed as he slammed the shell and tongs to the floor; "it's not ze heat, Check, eet's ze Blue Devils!" With that the poor man threw the straps over his shoulders, kicked off his grease-covered overalls, reached for his coat and lunch pail, then stormed out the door to enjoy the comforts of the snow at 45 below.

Advance all the gilt-edged theory you will about personal control, but

ONLY PHILLIPS RECESSED HEAD SCREWS


27
PHILLIPS MANUFACTURERS HAVE FACILITIES FOR PRODUCING MANY MILLIONS OF PHILLIPS SCREWS PER 8-HOUR DAY
Remember, unlimited production potential is one of the basic essentials you can't afford to overlook in choosing a cross recessed head screw. With Phillips Screws, you can depend on it.
17

are available from MULTIPLE sources of supply

With the cross recessed head screw rapidly becoming the preferred screw for all types of industrial assemblies, it is all-important to be sure that present and future needs can be supplied.

Since Phillips is the only cross recessed head screw with *multiple* sources of supply, Phillips Screws are your logical choice. And this is just one of the five important reasons why *only* Phillips Screws give you *all* the advantages of the cross recess design.

Get this new Fact-Full Booklet

that lets you in on the important facts you can't afford to overlook when you choose cross recessed head screws. It's FREE. Use the coupon.

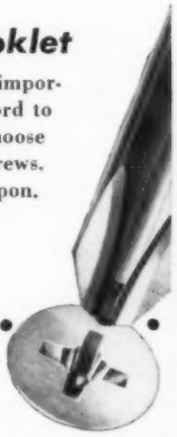
GET ALL THE ADVANTAGES OF ASSEMBLY WITH CROSS RECESSED HEAD SCREWS . . .

GET PHILLIPS *Recessed Head* SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

27 SOURCES

American Screw Co.
Camcar Products Co.
Central Screw Co.
Continental Screw Co.
Corbin Screw Div. of American Hdwe. Corp.
Elco Tool & Screw Corp.
The H. M. Harper Co.
Lamson & Sessions Co.
Milford Rivet and Machine Co.
National Lock Co.
National Screw & Mfg. Co.
New England Screw Co.
Parker-Kalon Corporation
Pawtucket Screw Co.
Pheoll Manufacturing Co.
Reading Screw Co.
Rockford Screw Products Co.
Russell Burdsall & Ward Bolt & Nut Co.
Scovill Manufacturing Co.
Seaboard Screw Corp.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
Sterling Bolt Co.
Stronghold Screw Products, Inc.
Wales-Beech Corp.
Wolverine Bolt Company



Phillips Screw Mfrs.,
c/o Horton-Noyes Co.
1800 Industrial Trust Bldg.
Providence, R. I.

Send me the new booklet—"How to Select Recessed Head Screws for Practical Production Driving".

Name _____

Company _____

Address _____

AM34

COMPLETELY **NEW**
CASE HARDENING PROCESS

Carburit

ULTRA RAPID PACK
HARDENING PASTE

HIGH RAPIDITY OF PENETRATION
.040" in 25 to 30 Minutes
SOLVES PROBLEM OF SELECTIVE HARDENING
by applying only to desired sections
NO SPECIAL FURNACES OR EQUIPMENT NEEDED
—even an open fire will suffice
ENORMOUS TIME SAVING
—repair units can be hardened right in maintenance shop. No special training required
CARBURIT IS NON-TOXIC

Isopac

ISOLATING PASTE

KEEPS DESIRED SECTIONS SOFT

While rest of workpiece is being hardened

REPLACES COPPER PLATING—
and other expensive methods.

JUST PUT ON AND KNOCK OFF
Saves time, money.

PREVENTS PENETRATION OF CARBON AND SLOWS DOWN COOLING OF COVERED SECTION.

NO SHRINKING OR CRACKING

Guaranteed Results

• *Send for completely descriptive circular*

DENFIS *Chemical Laboratories Inc.*

172 PACIFIC ST. (Phone UL 5-5295) BROOKLYN 2, N.Y.

Check **An·cor·lox**
TRADE MARK REGISTERED

before you pick a lock nut...

If you haven't given An-cor-lox a trial, *DO IT*, before you pick a nut that has fewer advantages. An-cor-lox nuts are VERSATILE... They can be used where other lock nuts are impractical. For example:

- Locking device on the bottom permits a short stud.
- Cap nuts, thin nuts and spanner nuts are all available.
- Wide choice of materials and finishes for resistance to corrosion, heat and severe atmospheric conditions.
- The locking device fits snugly against the work, forming a pressure seal.

DON'T select your lock nut until you've tested An-cor-lox. Write to us today for descriptive material and free standard samples to fit your application.

An·cor·lox
TRADE MARK REGISTERED
Lock Nuts

LAMINATED SHIM COMPANY, Inc.
An-cor-lox Division
3110 Union Street Glenbrook, Conn.

AN-COR-LOX NUTS • SHIMS • SHIM STOCK • STAMPINGS

the fact remains that there are days when a person is decidedly off the ball. If a man is honest enough to admit his inability to cope with some harrowing influence, give him the benefit of the doubt and send him home. Let him get away from it all and stand for a few hours on a brass rail, or, perchance, bask in the healing comforts of a warm sun while he awaits the bobbing of a colorful cork. Yes sir, the most effective remedy for Blue Devils is to beat them at their own game: chuck off the shackles of routine and exuberate in a well-rounded, "Ah, ta Hell with it," and see how much better your differential will function the next day.

John Homewood
Ontario, California

•

I agree with Al's suggestion that the workman with an "off day" be allowed to leave his job. But I'd go further and offer the man a chance to make up his lost time, or if the work is especially hazardous, involving risk to property and person, give a temporary transfer to a different, easier job, as a sort of "relief". An ounce of prevention is worth a pound of cure.

But this is only an opinion of what would be practical in an ideal situation. Human nature not being perfect, the privilege would be abused. Then again, factory rules (at present, at least) are too rigid to allow this (especially in the large, highly-systematized plants). So hope is hardly present from this end. However, if the workman was willing to lose the time, offering an "off-day" for an excuse, why penalize him? Perhaps the foreman could understand his help and tell whether or not the man was bluffing.

I have had those days myself, when one thing after another, turned bad. But knowing I couldn't do anything else, I just kept to myself, and only attempted a job I was sure of. I can't figure out the reason for these "off days". Maybe it is just my imagination, or I was just trying too hard.

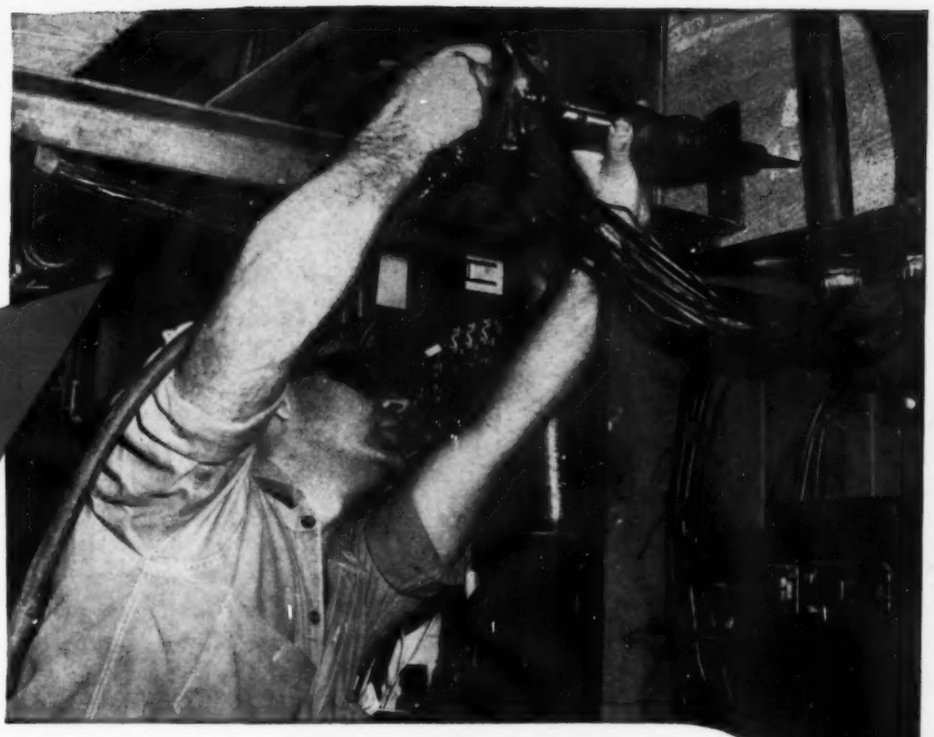
Edward Diskavich
Torrington, Conn.

•

GAMBLING ON THE LONG GREEN

Reynolds, in staking his future on "a new gadget," is doing exactly what his present employer did some years back.

Any new enterprise is a risk, regardless of how positive its founders



SAVE TIME AND MONEY

with the **CLECO**

HANDI-DRILL

The Self-Rotating Rock Drill

A Light Hand-Held Pneumatic Drill that Hits and Rotates for Faster Penetration

A Few of the Features:

- ONE-HAND OPERATION
- LIGHT IN WEIGHT (9 LBS.)
- SIMPLE IN CONSTRUCTION
- PRACTICALLY NO RECOIL
- HITS AND ROTATES AT SAME TIME FOR FASTER PENETRATION
- PATENTED SAFETY RETAINER PREVENTS ACCIDENTAL RELEASE OF TOOL FROM DRILL
- CONVERTIBLE TO CHIPPING HAMMER BY REMOVAL OF ONLY ONE PART

Available for Immediate Delivery

THE ROTATING-DRILLING ACTION ASSURES FASTER PENETRATION IN ALL TYPES OF MASONRY

CLECO AIR TOOLS

CLECO ACCESSORIES

CLECO DIVISION

of the REED ROLLER BIT COMPANY, P. O. Box 2119, Houston, Texas, U.S.A.

DIVISION OFFICES

MISSOURI
2322 Locust St.
St. Louis

NEW JERSEY
75 Lock St.
Newark

OHIO
431 Temple Bar Bldg.
Cincinnati

PENNSYLVANIA
Mascher at Lippincott St.
Philadelphia 33

IN CANADA: CLECO PNEUMATIC TOOL COMPANY OF CANADA, LTD., 927 MILLWOOD ROAD, TORONTO (LEASIDE), ONTARIO

DISTRIBUTORS IN PRINCIPAL CITIES OF THE UNITED STATES AND THROUGHOUT THE WORLD

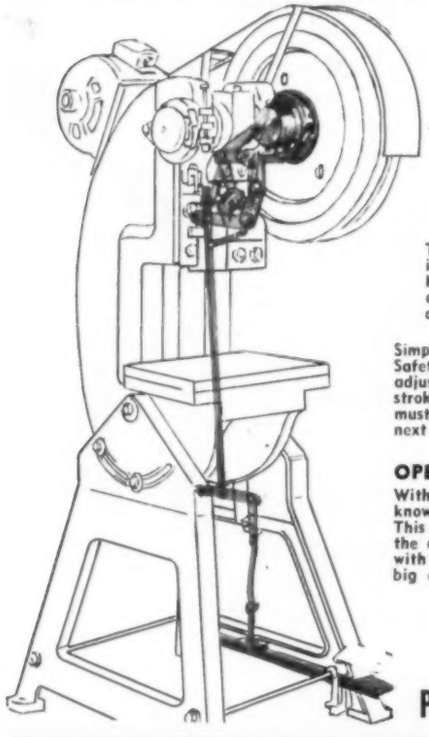
WESTINGHOUSE handles sheets the Easy Way

Here's a 10 ton C-F Lifter handling bundles of sheet steel in a Westinghouse plant with ease and safety. High grade sheets like these, used in stator and rotor laminations, must be handled carefully—and in a busy plant, they must be handled quickly. That's why a C-F Sheet Lifter is doing the job.

C-F Lifters are made in manual or motor models in capacities from 2 to 60 tons or larger, in standard or semi-special designs. Write for the illustrated bulletin "C-F Lifters"—it may help solve a tough materials handling problem for you.

CULLEN-FRIESTEDT CO.
1313 S. Kilbourn Ave., Chicago 23, Ill.

HANDLE SHEETS with C-F LIFTERS



How GREATER SAFETY Increases Press Output

Press-Rite Presses Eliminate Operator Fear!

The new Safety Non-Repeat Single Stroke Mechanism is the outstanding feature of the 1948 line of PRESS-RITE Presses. It eliminates operator fear and increases output two ways. In addition, it protects not only the operator but the dies and the press too!

Simple in design but positive in action, the PRESS-RITE Safety Non-Repeat Mechanism does not rely on springs, adjustable set screws or similar devices. After each single stroke of the press, the operator knows the foot treadle must be completely released and pressed again before the next stroke is possible.

OPERATOR OUTPUT INCREASED TWO WAYS

With confidence in his PRESS-RITE Press, the operator knows he has ample time to properly position material. This eliminates many rejects and increases output. Also the operator does not fatigue as easily because he works with a feeling of greater security. Increased output pays big dividends.

Have your PRESS-RITE dealer show you how the Safety Non-Repeat Single Stroke Mechanism and many other press features can increase your output, or write us Dept. 228 today.

PRESS-RITE OPEN BACK INCLINABLE PUNCH PRESSES

Sales Service Machine Tool Co.

2363 UNIVERSITY AVENUE
ST. PAUL 4, MINNESOTA

are of success. The founders gamble on their ability to unite demand sales, production, labor, engineering and many other factors into sufficiently harmonious proportions so annual statements will be recorded in black. Al, Ed and Reynolds all owe their present jobs to the pioneering spirit of someone before them. It is highly probable that their product may have been considered a "new gadget" before their firms went into business.

Reynolds is gambling on a small loss now, against a possible large return in the future. Since he has been invited into the new venture with the enticement of an interest in the firm, he must be a good mechanic and can probably ask for top-scale pay wherever he works. Therefore, the 15-cent decrease is only a small percent of his hourly rate and well worth the possibility of an interest in the new firm. Should this venture prove successful, Reynolds would be repaid many times financially and in the sheer joy that comes with working for the winning team.

Both Al and Ed should extend their best wishes toward Reynolds, and leave the door open for him if he must return. If Reynolds is induced to remain at his old job, and the new firm succeeds, he might be so resentful as to be useless. If Reynolds is permitted to leave, with no resentment, then the company gains in morale when the men realize that there is no opposition towards their improving themselves. If Reynolds does return, he will be an all-the-more-loyal worker because of his past experience and the decent, understanding treatment he received from his old company.

Norman L. Naidish
Brooklyn, N. Y.

OFFSET ANGLES—*CORRECTION*

The article "Offset Angle for Chamfering is Found by Trigonometry" in the Aug. 26 Practical Ideas contained two mistakes.

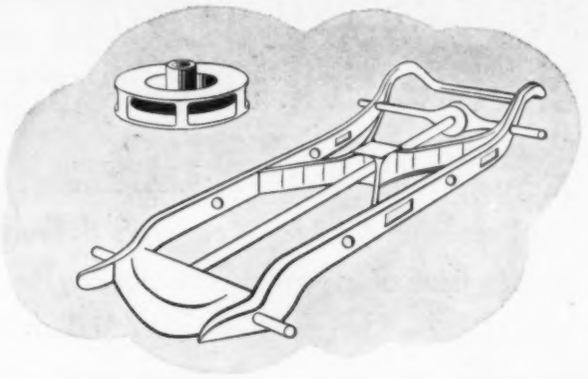
$G = \frac{F}{\tan X}$, not minus as printed, and

$\text{Tan } Y = \frac{E}{G}$, not $\frac{F}{G}$ as printed.

These corrections should be made. If the tangents of both X and Y were $\frac{F}{G}$, there would be no angle Z, so the setting of the chamfering tool would be the same as the angle of chamfer. *W. Wallace Boyd, Glen Ridge, N. Y.*

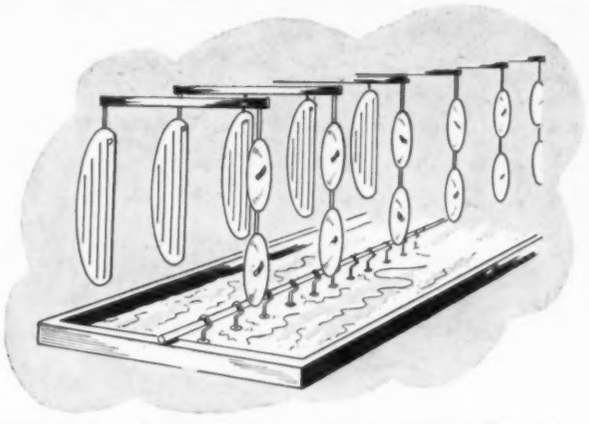
Clean all sizes of parts quickly, efficiently . . .

To clean any size or shape of part thoroughly . . . in one minute or less . . . in a single operation . . . it's Vapor Degreasing. Metals, glass and other materials are left clean of grease and oil, produced clean, warm and dry—ready for the next step.



And simplify handling and finishing

Cleaned parts are ready for inspection, assembly, further fabrication or finishing. Finishing rejects are minimized because solvent removes grease from deep draws, holes, almost inaccessible places. Risk of damage to delicate parts is reduced. Vapor Degreasing consumes only small quantities of solvent. Contaminated solvent is easily recovered for reuse.



Here's where you'll get the facts

This book tells how Vapor Degreasing simplifies production, how you can save time and cost in production, how the process can be used alone or as part of a flow line. It shows typical compact, modern equipment, which is available for efficient and economical operation. And it tells about solvents used in this equipment—Du Pont Trichlorethylene and Perchlorethylene—which under various trade names have been widely used for many years. Send for it today! Mail the coupon to E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Wilmington 98, Delaware.

DU PONT *Non-Flammable* **SOLVENTS for VAPOR DEGREASING**

SOLD NATIONALLY THROUGH DISTRIBUTORS

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department
Wilmington 98, Delaware

Please send me my copy of "**Metal Degreasing—Standard Practices.**"

Name_____ Position_____

Firm_____

Address_____ State_____

City_____

Tune in to Du Pont "CAVALCADE OF AMERICA," Monday nights—NBC coast to coast.

Central system clarification of coolants gives.... 6 money-saving advantages

A central system featuring Honan-Crane Automatic Clarifiers and Houdaille Conveyors delivers a continuous flow of clean coolants to any number of machine tools. Chip and contamination disposal problems are fully solved. Operating economies more than justify the expenditure for this equipment.

NOTE: Other types of central systems for cutting oils, hydraulic oils, rolling mill oils, etc., feature Honan-Crane Purifiers, Filters and other items of equipment. Write for case histories on actual installations.

1. Increases tool life
2. Eliminates Individual machine tool coolant pumps and motors
3. Better finishes with fewer rejects
4. Eliminates labor necessary to clean individual machine tool sumps and lines
5. Extends coolant life thereby relieving disposal problems
6. Better control of Dermatitis problems

HONAN-CRANE AUTOMATIC CLARIFIER . . . This clarifier removes abrasives, dirt and other solid contamination from water soluble coolants used for grinders, broaches, boring machines, milling machines and other metal working machine tools.

THE *Houdaille CONVEYOR . . . This effective conveyor is the final step in eliminating manual labor requirements for oil and coolant clarification systems. The chain and flights which travel through standard 2", 4" or 6" pipe are routed along the bottom of a V-shaped settling tank. An open section of pipe is employed at this point. Chips, sludges and other contaminants are collected, as they settle, and are transported over any required route of travel to a hopper for disposal. A sludge cart may be used to move the sediment for final disposition. Flights are neoprene, steel backed. The conveyor is driven by an electric motor, through reducing gears.

*Pronounced Hoo-dye

HONAN-CRANE CORP

205 WABASH AVENUE • LEBANON, INDIANA

☐ Please send actual case histories on Central Systems for

_____ for _____
(Oils or Coolants) (Type of operation)

☐ Please send complete information on Automatic Clarifier

☐ Please send complete information on Houdaille Conveyor

☐ Please have a salesman call

Name _____

Company _____

Address _____

City _____ State _____

A SUBSIDIARY OF
HOUDAILLE-HERSHEY
CORPORATION

DEPENDABLE METALS

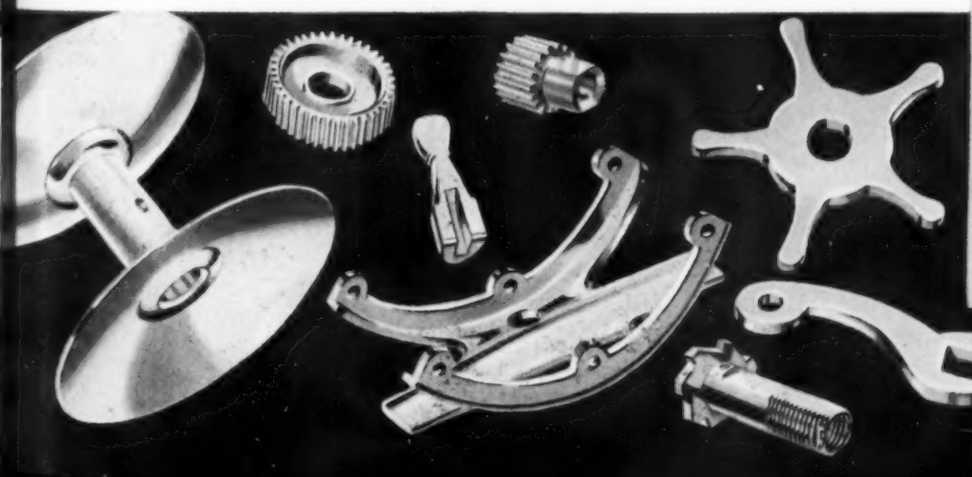
are essential . . . and so are Production Economies

The more you examine a well-made fishing reel the more apparent it becomes that its modest cost is a high tribute to the manufacturer's efficiency. Here also is impressive evidence of the advantages that make brass, bronze, and other copper alloys so indispensable where high quality and low cost must be combined.

This reel is the "Bay City No. 112," made by Ocean City Mfg. Co., Philadelphia. It contains more than 50 copper alloy parts—made from seven different alloys in strip and rod form. All are standard Anaconda Metals.

Free-cutting brass rod is used for most machined parts. The precision cut gears are of leaded phosphor bronze and hardware bronze. Stamped parts such as stand, spool flanges, handle and click are of brass and nickel silver strip. External parts made from these alloys are given a durable chromium plate at minimum cost.

So here's another case where copper alloys were selected to meet known standards for fabrication and product performance. *Preliminary result:* such manufacturing economies as accurate machining at high speeds, long tool life, high salvage value of scrap and low finishing cost. *End result:* a rustproof, dependable and long-lasting product—surprisingly moderate in cost. 48117



ANACONDA
from mine to consumer

Anaconda

COPPER ALLOYS

Everybody knows

FIXTURES THAT *LAST* ARE MADE OF BRASS

Back of the chromium-plated brilliance of good plumbing fixtures is sound, solid, rustless, long-lived brass.

The Guarantee Specialty Manufacturing Company of Cleveland, Ohio, produces untold millions of drawn and stamped parts for makers of plumbing fixtures. A *must* with Guarantee Specialty is brass that's *just right* in composition, grain size, temper and finish. This customer says:

"For over 30 years The American Brass Company has furnished us materials exactly suited to our needs. Working towards manufacturing economy and high quality of finished product, its Technical Department has always cooperated fully with our engineering staff."

In this case, stamping and drawing operations attain maximum speed with a minimum of rejects, plus long life for dies. Threads are true and speedily cut. Brass scrap has high salvage value.

The designer has a freer hand in attaining graceful, flowing lines. Parts can be economically finished with chromium-plating that's really brilliant because of fine-grained base metal.

The sum of these time-honored advantages is superior products at competitive prices.

The American Brass Company produces Anaconda Copper and Copper Alloys in practically all commercial forms; also in special shapes and die pressed forgings. Whether your quantity requirements are large or small, our Technical Department will gladly make available to you the benefits of our long manufacturing experience and the knowledge we've acquired in helping hundreds of manufacturers determine the copper alloy best suited to the job.

THE AMERICAN BRASS COMPANY
General Offices: Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
In Canada: ANACONDA AMERICAN BRASS LTD.,
New Toronto, Ont.

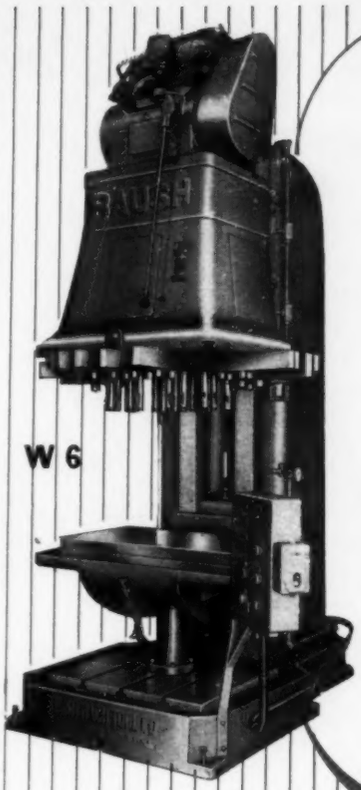
ANACONDA
from mine to consumer

Anaconda
COPPER & BRASS

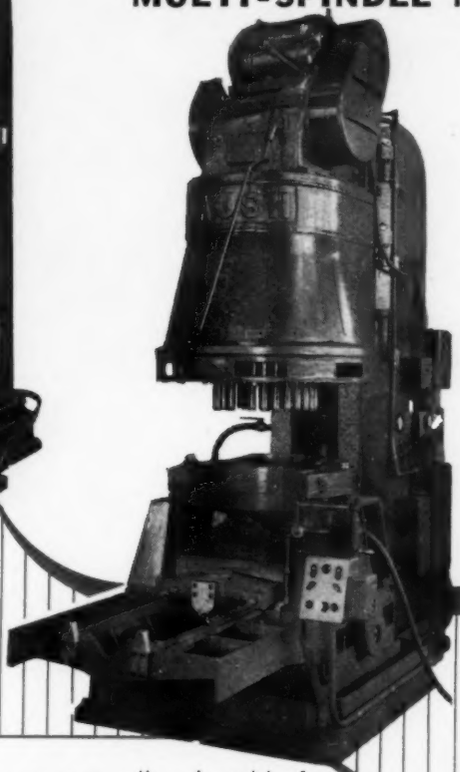
Representative assortment of brass plumbers goods manufactured by Guarantee Specialty Manufacturing Company, Cleveland, Ohio.

GREATER PRODUCTION
at lower costs . . .

THAT'S A "MUST" IN BAUSH "W" TYPE MULTI-SPINDLE MACHINE TOOLS!!



W 6



W 7

These exceptionally versatile multi-spindle drilling and tapping machines fit the needs of nearly all manufacturers for "greater production at lower costs."

Essentially designed and built for heavy duty and hard usage, the Baush "W" Type machines are known for their rigidity, simplicity, accuracy and ease of operation.

W 8

Baush "W" Type machines are especially adaptable for both flange drilling and rectangular hole layouts. Available in 3 sizes, shown in specifications, with adjustable arms to handle drilling of hole centers that constantly vary — or with master-bored cluster plate having spindles in fixed pattern to fit one operation. Horsepower capacities are graduated to cover predominant drilling operations. • Spindle heads are of adjustable, joint driven type, with slip sleeve spindles or adjustable arms that can be furnished in various standard sizes to meet work requirements. "W" Type machines are arranged for 18" maximum stroke of heads — adjustable feed rates — 2 speed geared yokes and can be adapted for tapping. Either adjustable knee tables, box tables or rotating tables are available.

Also furnished as single way, 2-way or 3-way machines.

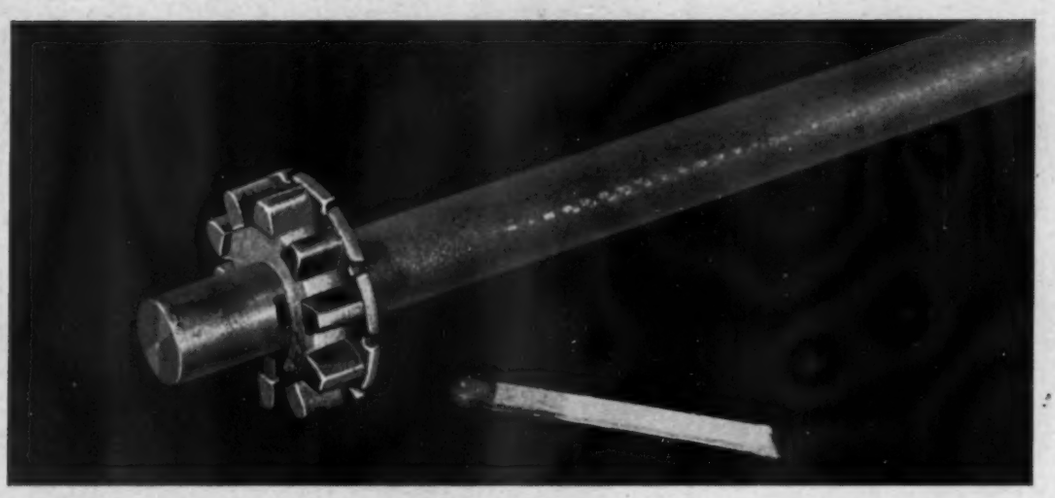
SPECIFICATIONS OF STANDARD W-TYPE MACHINES

	W-6	W-7	W-8
Maximum Horsepower Capacity for Spindle Drive	10 H.P.	20 H.P.	30 H.P.
Top of Base to Bottom of Head Flange, Head up	60"	54"	50"
Max. Standard Stroke of Head	18"	18"	18"
Overall Height of Machine with low base	139"	141"	150"
Approx. Net Weight of Machine (Lbs.)	15,000	20,000	27,000
Head Sizes Available— Measurements taken between Spindle centers as follows: At Side, S. At Front, F.	18"S. x 24"F. 18"S. x 36"F. 24"S. round	20"S. x 30"F. 20"S. x 45"F. 32" round 36" round	20"S. x 30"F. 20"S. x 52"F. 32" round

BAUSH

MACHINE TOOL CO.

SPRINGFIELD 7, MASSACHUSETTS

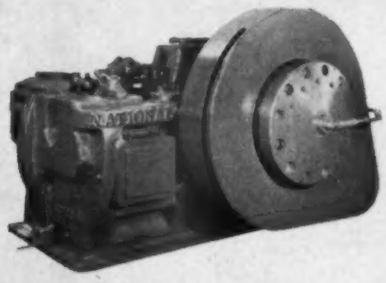


NO MACHINING REQUIRED!

The Automobile Seat Regulator Rod shown above formerly consisted of a ⅜″ diameter by 40″ long rod, to which a machined gear was pinned at each end.

This part is now forged completely on a National 1½ High Duty Forging Machine. Gears are forged to final size and shape, and the bearing end is held to .005″ tolerance, with the result that no machining is required.

Perhaps you, too, can simplify parts, eliminate machining, and cut costs with National Forging Machines and a National technique. Why not investigate?



National 1½ High Duty Forging Machine

NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO.

DESIGNERS AND BUILDERS OF
MODERN FORGING MACHINES—MAXIPRESSES—COLD HEADERS—AND BOLT, NUT, RIVET AND WIRE NAIL MACHINERY

New York Detroit Chicago

Now a belt that speeds up stock removal, and *lasts 2 to 4 times longer*

THE *NEW* RESINALL METALITE*

Here's a cloth backstand belt that takes the high heat of fast stock removal, and gives 2 to 4 times the usual dry grinding mileage.

The answer is *in the bond* — a thermosetting resin that heat cannot weaken, combined with the Behr-Manning patented Durabonded* process which assures extra strength and grain-grip, and retards loading. This heat-proof bond locks every abrasive grain in its original, correct cutting position.

Result: Sustained sharp cutting, 2 to 4 times longer — less down-time for belt changing — higher production and economy all along the line.

RESINALL METALITE BELTS
are available NOW from your regular distributor in 24 to 120 Norton Alundum Grit.

BEHR-MANNING • TROY, N. Y.
Division of Norton Co.

* *Reg. U. S. Pat. Off.*

GET A FREE DEMONSTRATION

See the new RESINALL METALITE belt do its stuff in your own shop on your own work. No obligation. Just mail the coupon.

BEHR-MANNING — Troy, N. Y.

We'd like to see what your new RESINALL METALITE belt can do on our work. Send your demonstrator along.

NAME .....

COMPANY .....

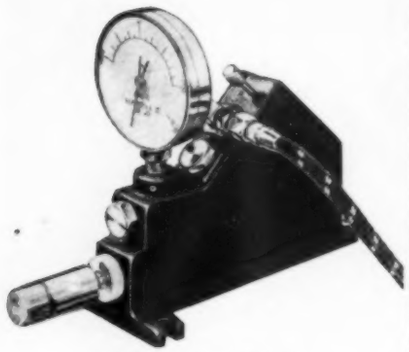
ADDRESS .....

CITY ..... STATE .....

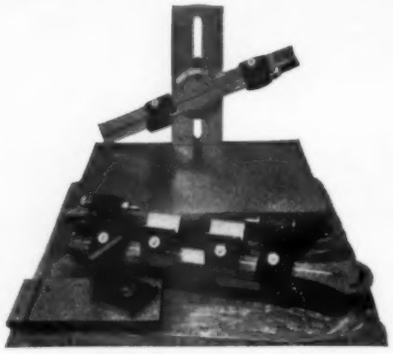
Look to Merz

for precision equipment for every inspection need!

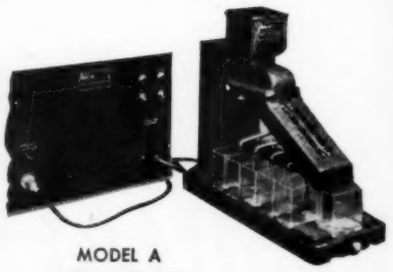
EXACTITUDE
STANDARD A.G.D. GAGES



VERSATILE—MODEL 30
NEW-MATIC MEASURING MACHINE

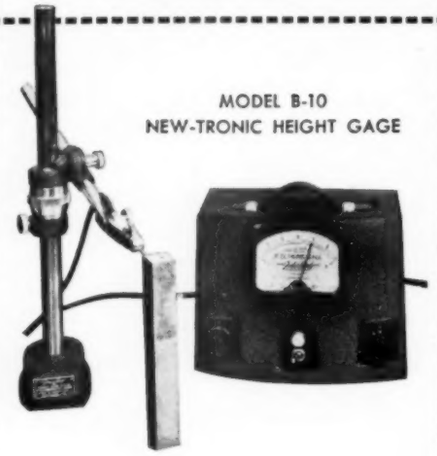


MASTER MODEL
UNIVERSAL CHECKING PLATE



MODEL A
NEW-TRONIC
BALL SORTER

MODEL A-10
NEW-TRONIC
COMPARATOR



MODEL B-10
NEW-TRONIC HEIGHT GAGE

VIGILANT—MODEL 60
NEW-MATIC
MEASURING MACHINE

Whatever your inspection requirements, look with complete confidence to Merz precision measuring and checking machines. Every Merz product is a proved cost-cutter, a tested time-saver. The Merz line includes *New-Matic* Measuring Machines, *New-Tronic* Comparators and Gages, Checking Plates, Standard A.G.D. Gages. Merz also specializes in the custom-building of equipment for handling unusual inspection and sorting problems, however complex. Merz inspection equipment has for years been helping to reduce loss, speed production and increase profits for many of the nation's leading industries. Write for complete information on how Merz' "Four Spheres of Service" can do the same for you.

MERZ ENGINEERING COMPANY • INDIANAPOLIS 7, INDIANA

MERZ

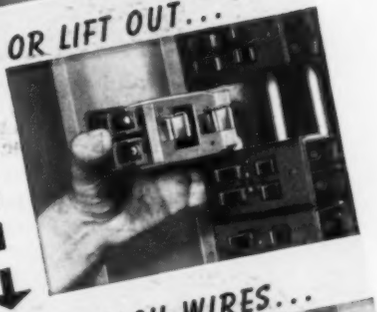
The House That Precision Built

THE NEW NMO "PLUG-IN" PANELBOARD

- ✓ Easy to Wire
- ✓ Simple to Add or Change Circuits
- ✓ Smaller—Yet More Gutter Space
- ✓ New Thermal-Magnetic (Coilless) Multi-breaker Units
- ✓ Application—wherever large number of branch circuits for lights, appliances and business machines must be switched and protected.

1 SWING OUT...

2 OR LIFT OUT...



3 ATTACH WIRES...

4 "PLUG-IN"

Compact, 4-circuit Thermal-Magnetic (Coilless) Multi-breaker units, equipped with positive-pressure contact jaws, grip cylindrical silvered bus bars.

"Plug-in" feature permits easy removal and insertion of units for future changes in circuit ratings or additional circuits if space for expansion is planned.

Low heating, permitting small size, is achieved by exceptionally high silver content in breaker unit contacts, and elimination of bolted current carrying connections.

Smaller size greatly improves utilization of wall and column space. Yet panel has more gutter space (5½" in 15" box) because of compact Multi-breaker unit. Narrow column type has twice number of circuits previously available in cabinets of similar height.

NMO panelboards are furnished with 100 and 200 ampere mains, 120/240 Volt A.C. with 15, 20 and 30 ampere single and double-pole branch circuits.

THERMAL-*Coilless*-MAGNETIC MULTI-BREAKER UNIT PROVIDES 2-WAY CIRCUIT PROTECTION

1. Thermal trip element holds harmless momentary overloads but trips if overload continues.
2. Magnetic element functions instantly on both moderate and heavy "shorts."

ILLUSTRATED NMO *Bulletin* gives complete information on the new Panelboards. Address Square D Company, 6060 Rivard St., Detroit 11, Michigan.

SQUARE D COMPANY

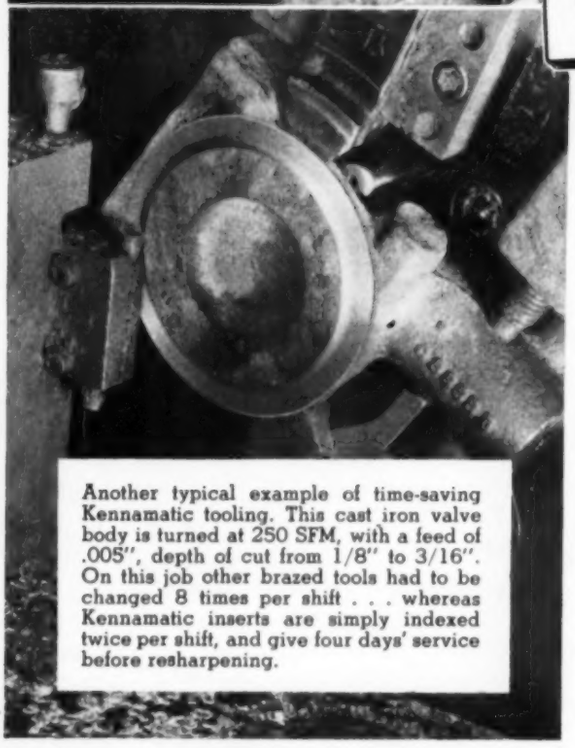
DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D CANADA, LTD., TORONTO, ONTARIO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

Here's a Proved Short-Cut to Savings

5 Kennametal tools in action, roughing a forged steel stem pinion, SAE 5140. Speed is 230 SFM, feed .027", depth of cut 3/16" . . . and the Kennametal tools turn out 350 pieces per index, 56,000 pieces per tool!

When the going gets tough . . . . Kennametal Tooling is the sure way to faster production at less cost



Another typical example of time-saving Kennametal tooling. This cast iron valve body is turned at 250 SFM, with a feed of .005", depth of cut from 1/8" to 3/16". On this job other brazed tools had to be changed 8 times per shift . . . whereas Kennametal inserts are simply indexed twice per shift, and give four days' service before resharpening.

Why wait for the going to get tough?

Under the pressure of rising costs—it becomes "tougher" and "tougher" to produce at a profit, and sell at a price.

But remember that "tough" is a relative term—any job is tough if there's an easier, faster, less expensive way to do it.

Your machining operations are tough, slow, and expensive . . . unless you are using uniformly strong, hard, long-lived Kennametal coupled with the latest Kennametal improvements in carbide tool design.

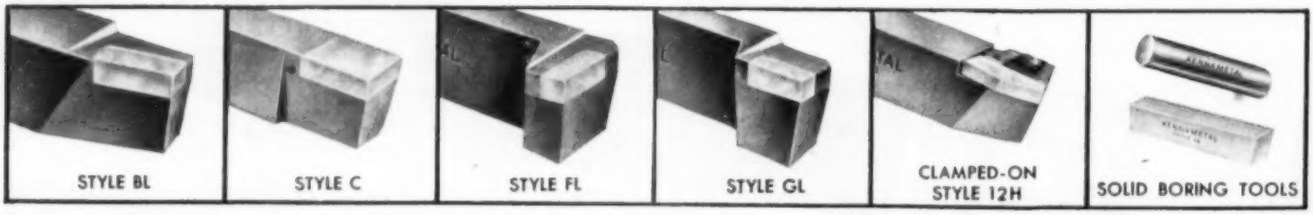
Kennametal tooling keeps your machines on the job with minimum interruption—enabling you to turn out from 2 to 5 times more than steel tools on the same machine in the same time, with from 5 to 20 times longer tool life.

Use this modern tooling technique to save money in your plant—ask our district tool engineer to demonstrate.

Write for new Catalog 48.

KENNAMETAL *Inc.* **Latrobe, Pa.**

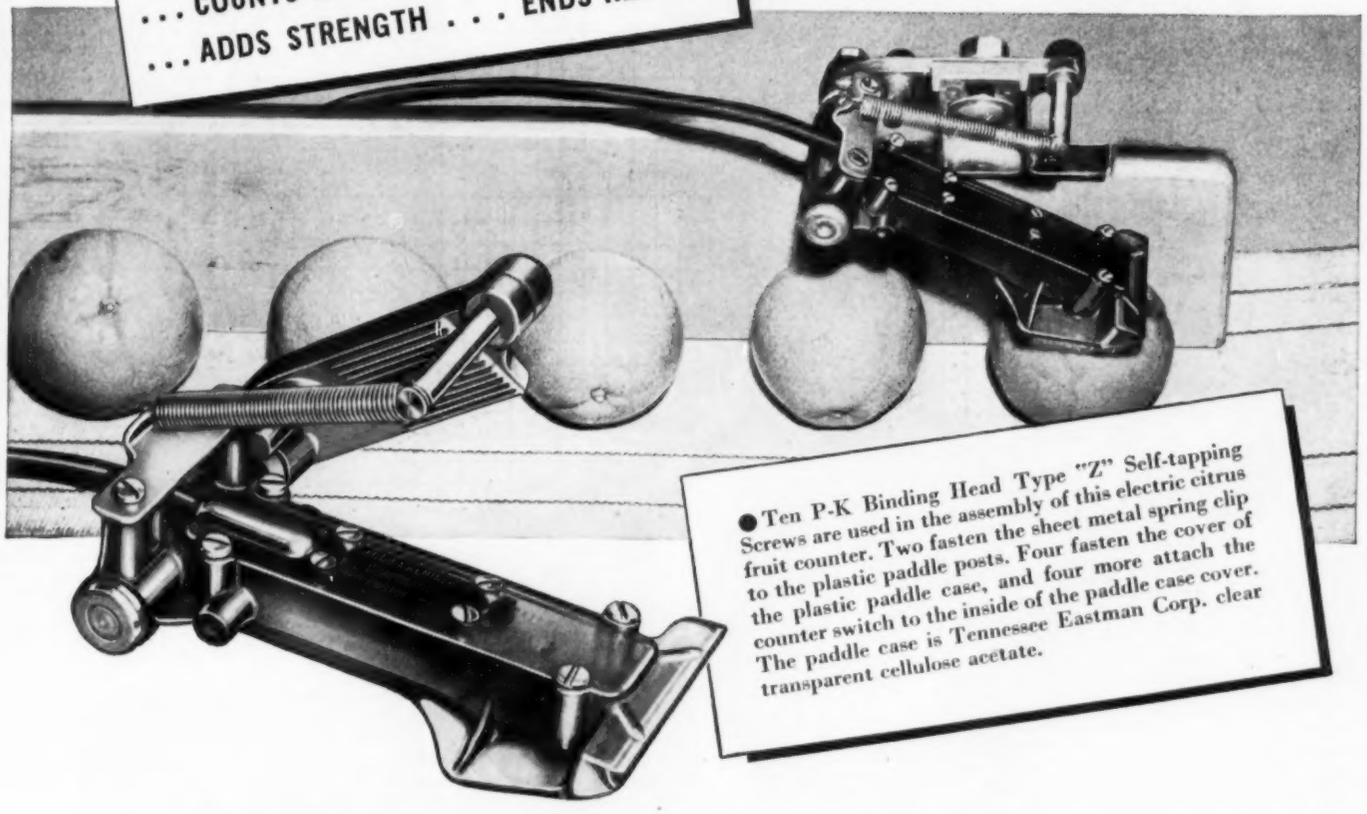
MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTION



COMMON SENSE ASSEMBLY ENGINEERING

Makes "impractical device" ...practical.....

...COUNTS OUT 10 TAPPING OPERATIONS
...ADDS STRENGTH . . . ENDS REJECTS



● Ten P-K Binding Head Type "Z" Self-tapping Screws are used in the assembly of this electric citrus fruit counter. Two fasten the sheet metal spring clip to the plastic paddle posts. Four fasten the cover of the plastic paddle case, and four more attach the counter switch to the inside of the paddle case cover. The paddle case is Tennessee Eastman Corp. clear transparent cellulose acetate.

"This entire unit would have been impractical without P-K Self-tapping Screws" says **Food Machinery Corporation,** who make this electric citrus fruit counter to speed the packing of oranges after they have been sized.

With machine screws, costly, work-slowing difficulties were experienced in the assembly of the plastic and metal parts. Rejects ran high when holes had to be tapped, and often the device failed when screws pulled out during the counting of as many as 50,000 oranges daily.

By switching to P-K Self-tapping Screws, these problems were quickly overcome. Ten tapping operations were eliminated . . . rejects were a thing of the past. In the words of the manufacturer, "P-K Self-tapping Screws have much better holding qualities . . . gave the counter the trouble-free sturdiness it needed."

Why not gain the benefits of common sense engineering in your product assembly? Question every fastening in your product. Find out if tapping and mold-slowing inserts can be avoided, and product design simplified, by the simpler P-K method.

Call in a P-K Assembly Engineer. In seven out of ten cases, he can demonstrate that P-K Self-tapping Screws will save up to 50% in assembly work hours. If you prefer, mail assembly details for recommendations. Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.

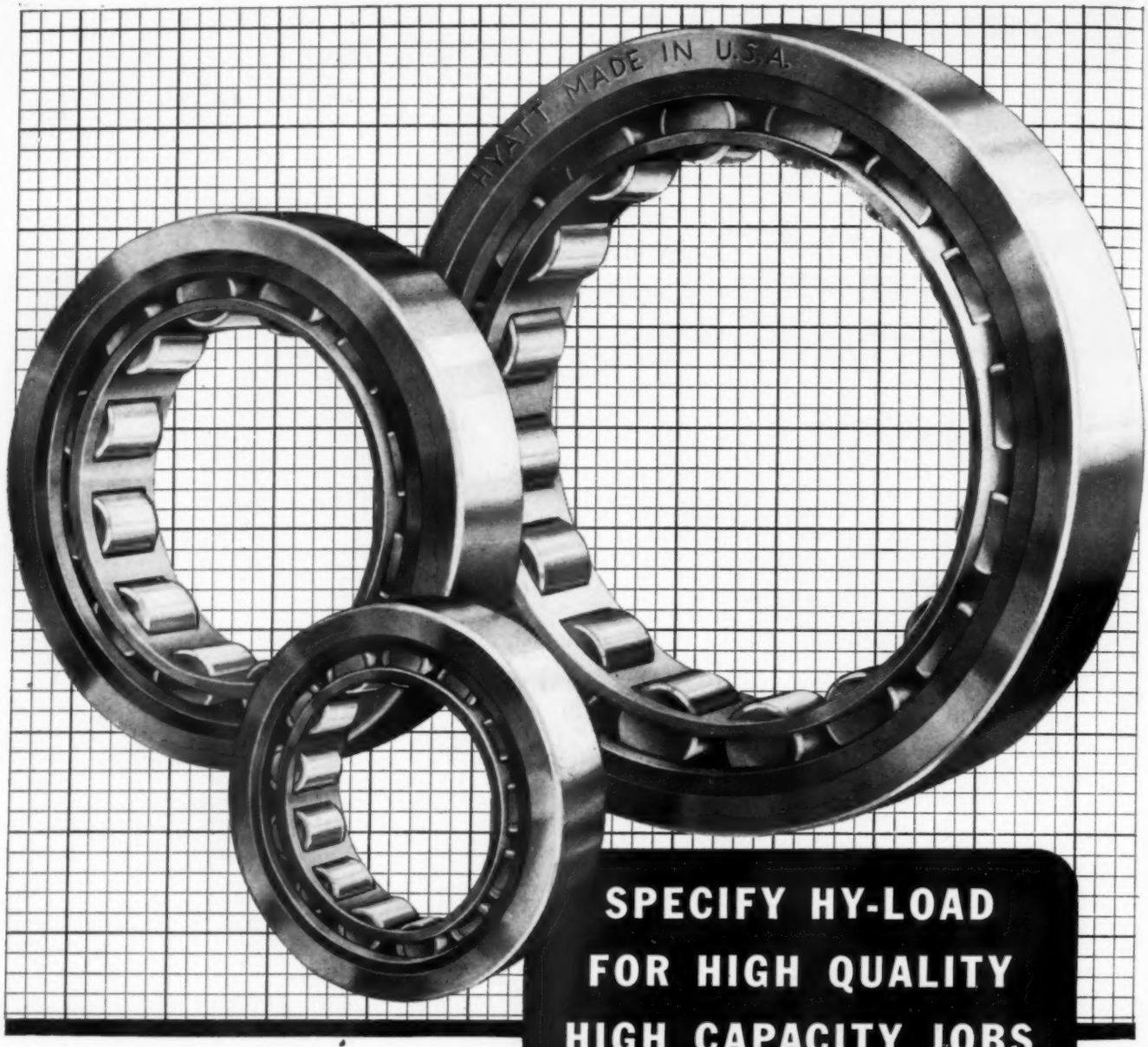
Sold Only Through Accredited Distributors

P-K® *The Original*

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY

PARKER-KALON SELF-TAPPING SCREWS

PARKER-KALON PRODUCTS COLD-FORGED SOCKET SCREWS, WING NUTS, THUMB SCREWS • HARDENED SCREWNAILS AND MASONRY NAILS SHUR-GRIP FILE AND SOLDER IRON HANDLES • METAL PUNCHES • DAMPER REGULATORS AND ACCESSORIES



SPECIFY HY-LOAD FOR HIGH QUALITY HIGH CAPACITY JOBS

HY-LOAD is an outstanding member of the Hyatt Roller Bearing family. Takes on tough loads without a murmur—rough service doesn't bother it a bit.

Universally useful because HY-LOAD is made in ten types and a wide range of sizes. A high quality roller bearing for high capacity work. Separate parts are completely interchangeable; adhering to AFBMA dimensions.

HY-LOADS, for years, have demonstrated their quality and trouble-free performance in many fields—mills and factories—on farms—oil fields—railways—highways and skyways. May we help you? Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

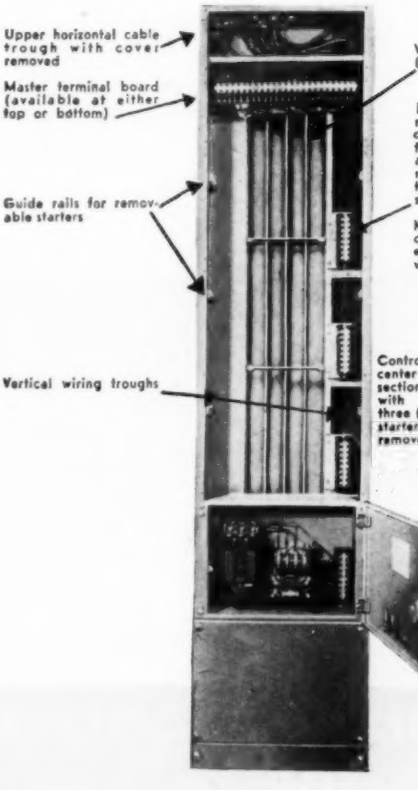
HYATT ROLLER BEARINGS

only FEDERAL NOARK CONTROL CENTERS have *ALL* these features

Because Federal NOARK Control Centers are COMPLETE . . . they're *easier* to buy, install, extend, rearrange, relocate, and service!

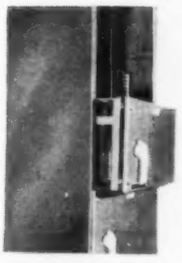
For details . . . contact the Federal NOARK District Office.

Removable cover over Main Bus and top horizontal cable trough
Removable cover over master terminal board compartment
Combination removable line starter units
Starters size #1 to #4 inclusive designed in multiples of a fixed dimension to provide maximum flexibility.
Space for future starter
Removable cover over bottom cable trough
Removable cover for extension of top horizontal cable trough when additional sections are added. These covers are on both sides of sections.
Removable cover for extension of main bus when additional sections are added. These are on both sides of sections.
Designed so that one vertical section can accommodate sizes #1 to #4 starters.
Bottom cable troughs with cover removed

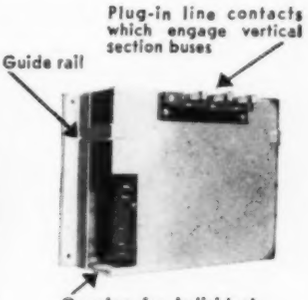

Upper horizontal cable trough with cover removed
Master terminal board (available at either top or bottom)
Guide rails for removable starters
Vertical wiring troughs
Vertical section buses (silver-plated)
Individual starter terminal boards. Starters can be removed from the front without disturbing adjacent starters, removing rear plates, or having loose wires in section.
Motor and control cables isolated from each other and from vertical buses.
Control center section with three (3) starters removed

Same vertical section used for front mounting or back-to-back arrangements.

Size #1 to #4 starter. Line plug eliminates necessity of shutdowns or working "hot" connections to remove starters.



View showing removable starter unit partially removed and being supported by its channel guides



Rear-view of removable combination line-starter unit

Federal NOARK *Control Centers*

Executive Offices: 50 Paris St., Newark, N. J.
Plants: Hartford, Conn.; Newark, N. J.; St. Louis, Mo.; Long Island City, N. Y.

Sales Offices in Principal Cities

Federal Electric Products Company, Manufacturers of a Complete Line of Electrical Products, including Motor Controls • Safety Switches • Service Equipment • Circuit Breakers • Panelboards • Switchboards • Bus Duct.

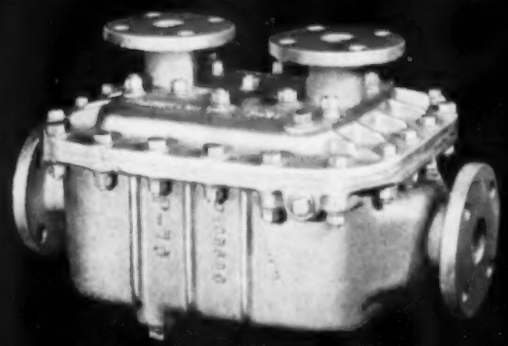
CAN waste BRING EFFICIENCY?

YES, you can waste heat and save production time

How can a device that *wastes* something be of interest to production men? Here's the answer. Harrison Oil Coolers waste heat—destructive heat—that would otherwise cause mechanical trouble, limit operating speeds, shorten machine life.

Compact, durable Harrison Oil Coolers can save production time in your plant. Consult Harrison.

HARRISON



HARRISON OIL COOLERS FOR INDUSTRIAL APPLICATIONS

HARRISON RADIATOR DIVISION OF GENERAL MOTORS CORPORATION, LOCKPORT, N. Y.

Tests prove them 3 to 10 times better

Gorham

M-40-U ALLOY CENTERS

GORHAM "M-40-U" is a special alloy developed by the Gorham Tool Company expressly for use as a wear and abrasion resistant metal. So superior is this alloy that by *actual test* it has shown results 3 to 10 times better than high speed steel and other alloy materials for centers. Standard M-40-U alloy tipped centers can be furnished from stock. ★ ★ ★ Special M-40-U Alloy centers can be furnished to your specifications, or our engineering department will assist you in the design of special centers to meet your needs. Choose GORHAM "M-40-U" for top performance and long wear.

GORHAM TOOL COMPANY

14400 WOODROW WILSON DETROIT, MICH.

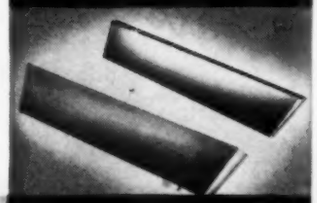
You can get these Special-Purpose tools

made of Abrasion-Resistant

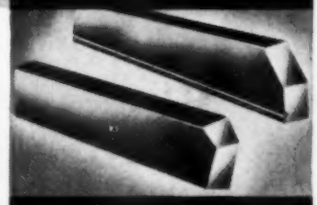
HAYNES STELLITE Alloy

Trade-Mark

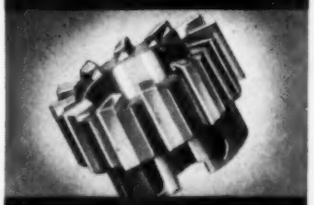
GROOVING TOOLS



CUTOFF TOOLS

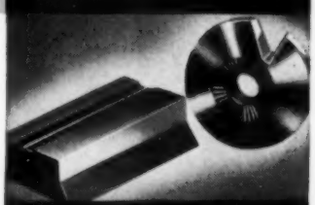


BORING AND REAMING BLADES



SHELL END MILLS

COUNTERSINKS AND SPOT FACERS



FORM TOOLS

Besides a complete line of standard tool bits, tool tips, tipped tools, and milling cutter blades, HAYNES STELLITE alloy is also available in a large variety of special tools for many different purposes. The tools illustrated at the right are only a few examples of the many forms in which this well-known alloy is supplied. Many types of milling cutters, core drills, counterbores, and similar tools are also available —and all tools are made accurately to your specifications.

HAYNES STELLITE alloy—composed of cobalt, chromium, and tungsten—is a high-speed cutting metal for machining ferrous and non-ferrous materials. The alloy has proved particularly suitable for turning, facing, boring, grooving, milling, and forming. It is inherently hard. And since its hardness does not depend on heat-treatment, tools made of HAYNES STELLITE alloy retain their cutting ability even at red heat. This unusual combination of properties—and a good balance of edge-strength and toughness—makes possible heavy cuts at high speeds. This, in turn, means high production at low cost per piece machined.

If you would like complete information on styles, sizes, and prices of HAYNES STELLITE alloy tools, write for a copy of the booklet, "HAYNES STELLITE Metal-Cutting Tools." Our staff of experienced tool engineers will gladly give assistance on your machining problems, if you will contact our nearest district office.

HAYNES alloys
TRADE-MARK

Haynes Stellite Company
Unit of Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices: Chicago — Cleveland — Detroit — Houston — Los Angeles — New York — San Francisco — Tulsa

The registered trade-marks, "Haynes" and "Haynes Stellite" distinguish products of Haynes Stellite Company.

ENGINEERING

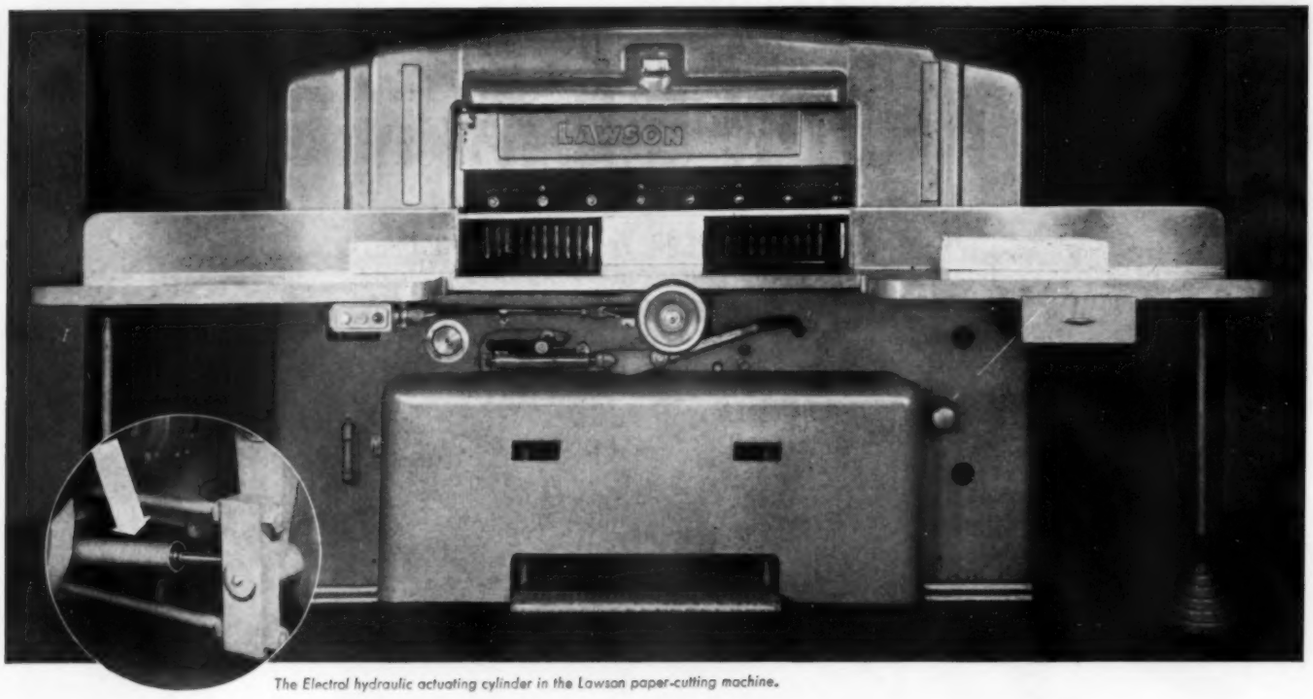
Knowledge gained in 43 years of cutting tool manufacture enables our Engineering Department to solve the most difficult machining problems of customers.

NATIONAL TOOL Co.

11200 MADISON AVE — NATIONAL Tools CLEVELAND — CLEVELAND, OHIO

TIP-TOE TREADLE ACTION CONTROLS TONS

with Hydraulic Engineering by Electrol



The Electrol hydraulic actuating cylinder in the Lawson paper-cutting machine.

How E. P. Lawson Company Built the First Successful Automatic Hydraulic Clamp Paper Cutter

Attracting wide attention is the new paper-cutting machine developed by E. P. Lawson Company's Frederick W. Seybold, world-recognized authority on paper cutter design and engineering.

One outstanding improvement in the Lawson machine is the use of an automatic hydraulic clamp and tip-toe treadle, which not only assures greater accuracy in cutting, but is far easier on the operator. It has other advantages, too, such as greater flexibility, faster operation and less maintenance.

To perfect this device Electrol engineers were called upon to design and build the hydraulic actuating cylinder, and supply the standard check valves of the system, without which these advantages would not be possible.

This is but one of many examples of how *hydraulic engineering by Electrol* is aiding designers to improve equipment in many fields of industry. It suggests, too, that the skill and experience of Electrol may prove of help to you in obtaining better machines for your own use—or for embodying hydraulic devices in the products you make.

Electrol engineers invite your inquiries . . . offer their co-operation in solving any problem involving hydraulics.

Electrol

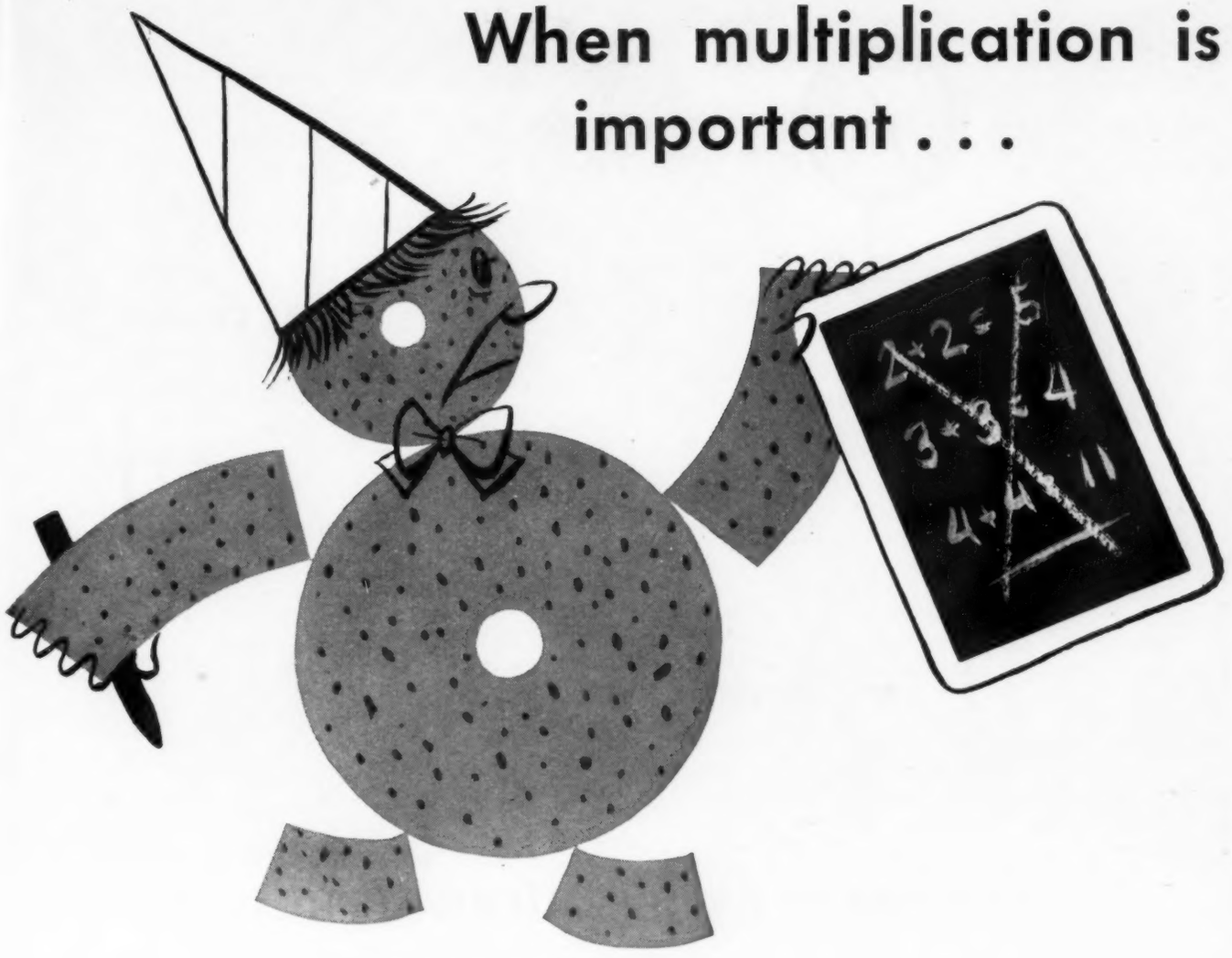
INCORPORATED

KINGSTON, NEW YORK

CYLINDERS • SELECTOR VALVES • FOLLOW-UP VALVES
CHECK VALVES • RELIEF VALVES • HAND PUMPS
POWERPAKS • LANDING GEAR OLEOS • SOLENOID
VALVES • ON-OFF VALVES • SERVO CYLINDERS • TRANSFER
VALVES • CUT-OUT VALVES • SPEED CONTROL VALVES

FOR BETTER HYDRAULIC DEVICES

When multiplication is important . . .



use ROBERTSON Grinding Wheels

Worried about production and increased costs? Have you examined your method of cost analysis? Are you designing products that can be ground instead of machined? Are you wasting time on your grinding operations?

Most important, don't neglect to give careful consideration to the selection of your grinding wheels. You'll find, in most cases, your best bet will be a Robertson Wheel. There's nothing superior to a Robertson for long wheel-life; fast, accurate production; and finish.

You can count on results like this from Robertson Grinding Wheels: A large manufacturing plant was grinding cotter-pins made from drop forgings. Taking off 1/16″ stock on a plunge cut, it was getting only 25 pieces per wheel-dressing. When a Robertson sales-engineer was called in, he studied the problem and recommended a Robertson SA 549-QV wheel. Immediately production rose to 125 pieces per wheel-dressing —an increase of 400 percent!

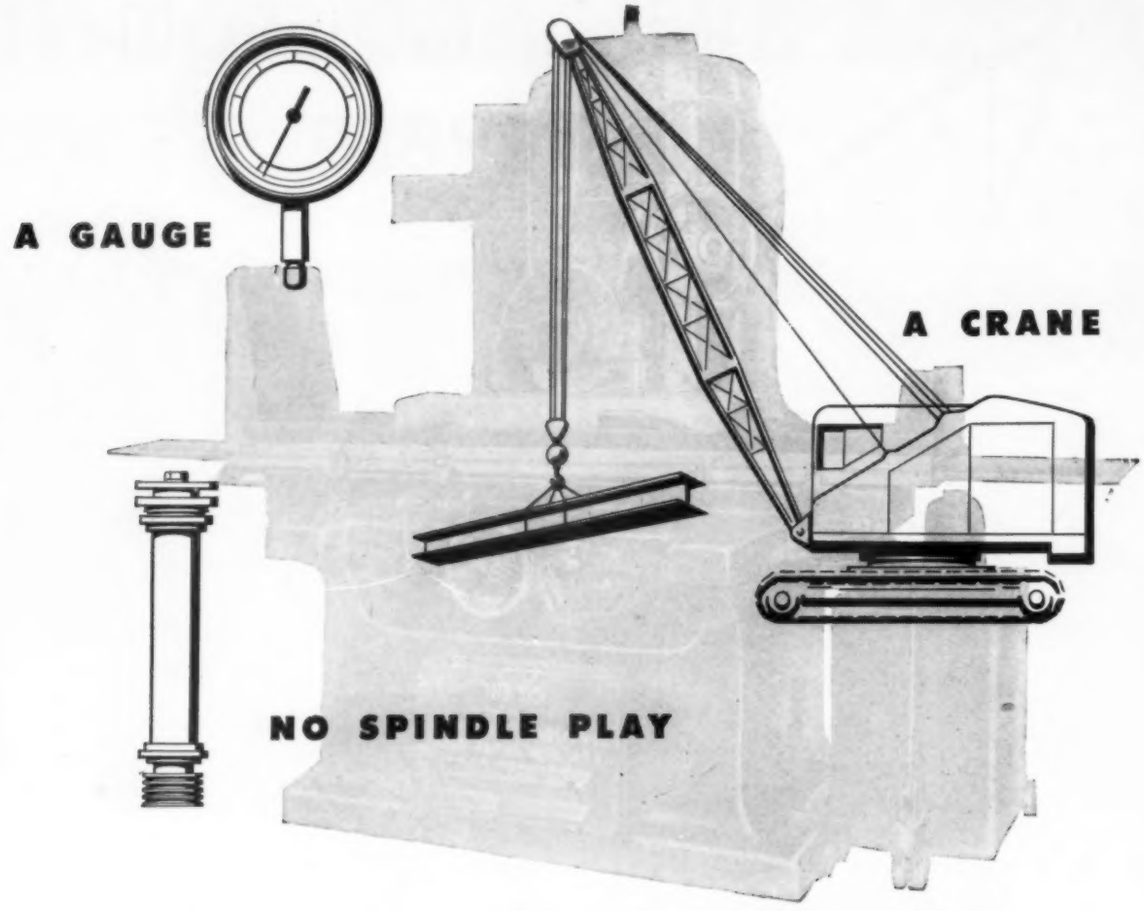
A sharp increase in production is not worth shouting about when it happens only once. Other users, however, are meeting with the same results: "Cuts grinding time in half" . . . "Production tripled" . . . "Reduces tool-grinding costs 10 percent to 20 percent." For all grinding operations—even the toughest ones—you'll get top results from Robertson vitrified-bonded or resin-bonded grinding wheels. Blueprint your problem, and let us recommend a wheel for your particular job.

ROBERTSON COOL-CUT

ROBERTSON MANUFACTURING COMPANY

TRENTON 5, NEW JERSEY

Resin-Bonded and Vitrified-Bonded Grinding Wheels • Mounted Wheels • Segments



AND GRAND RAPIDS' MICRO-ACCURACY*

A precision gauge can be only as accurate as the grinding machine used to finish-grind it. The sub-assemblies of a giant crane present an entirely different grinding problem. Whether in removing a few ten thousandths of metal in a high-accuracy operation, or in removing a lot of metal with greater allowable tolerances, freedom from spindle play is extremely important. That's just one of the reasons why you find Grand Rapids Grinders in so many leading plants of all types — from manufacturers of precision gauges to makers of huge cranes. Other assurances of long-life accuracy and speed are: the fastest longitudinal table speed (125 f.p.m.) available in any grinder; vibrationless rigidity achieved by massive one-piece column and base casting; patented vertical head adjustment; Bijur one-shot lubricating system.

*Accuracy within 0.00025 limits.

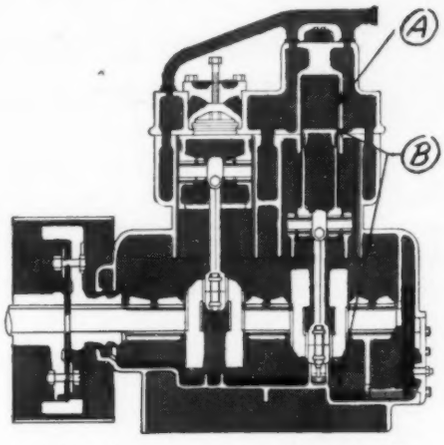
TO SERVE YOU — *Your inquiry concerning your specific grinding needs will receive prompt attention. Grand Rapids Grinders include: Hydraulic Feed Surface Grinders, Universal Cutter and Tool Grinders, Hand Feed Surface Grinders, Tap Grinders, Drill Grinders, and Combination Tap and Drill Grinders.*

GALLMEYER & LIVINGSTON COMPANY

330 Straight Ave., S.W., Grand Rapids 4, Michigan

GRAND RAPIDS GRINDERS

CASE 1045--MINIMIZING OIL OXIDATION AND DEPOSIT TROUBLE IN AIR COMPRESSORS.



TWO-STAGE, 2 CYLINDER AIR COMPRESSOR

In air compressors of all types and sizes, heat-resistant Calol Multi-Service Oil materially reduced deposits on discharge valves, cylinders, bearings and in crankcases. Comes in six viscosity grades: 45X, approximately SAE 10; 50X, SAE 20 medium; 55X, SAE 20 heavy; 65X, SAE 30; 75X, SAE 40; 85X, SAE 50.

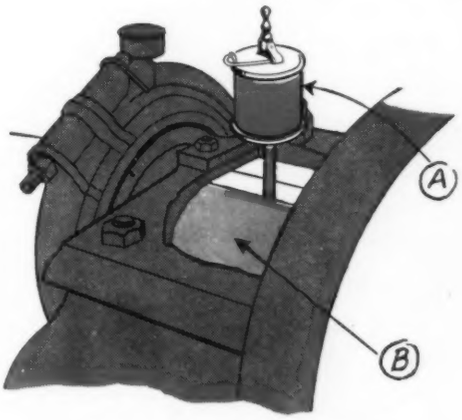
A. Detergent compound keeps parts cleaned of gum and lacquer and prevents ring sticking . . . provides constant lubrication on hot spots.

B. Oxidation inhibitor prevents formation of sludge and other deposits caused by air, extreme heat, moisture, dust and other contaminants.

Has high metal-adherent quality - maintains film of oil in idle machines which prevents starting wear and protects against rusting.

Calol Multi-Service Oil will correct gum and lacquer problems in many machines - in air compressors, Diesel and natural gas engines, enclosed gears, bearings.

CASE 1063—REDUCING CONSUMPTION OF OIL USED FOR GENERAL INDUSTRIAL LUBRICATION.



STEAM ENGINE MAIN BEARING

In severe lubrication conditions, such as in the main bearing of a steam engine, consumption of compounded Calol Red Engine Oil X was 20 to 30 percent less than that of straight mineral oil. It is recommended for all types of bearings except high-speed, flood lubricated, anti-friction bearings where pickup may be excessive. Comes in three grades: 13X, 16X and 26X.

A. May be applied by all types of oiling systems - compounds promote better circulation in ring-, and chain-oilers.

B. Contains stringiness and oiliness additives. Forms tacky "oilskin" on bearings - resists heavy loads and high temperatures. Reduces friction, high starting torque and wear.

Calol Red Engine Oil X has excellent metal-wetting ability - protects metal against rusting even in high humidity conditions. Cools rapidly.

For additional information and the name of your nearest Distributor, write

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street, San Francisco 20, California

The California Oil Company
Barber, New Jersey

The California Company
17th and Stout Streets, Denver 1, Colo.

Standard Oil Company of Texas
El Paso, Texas

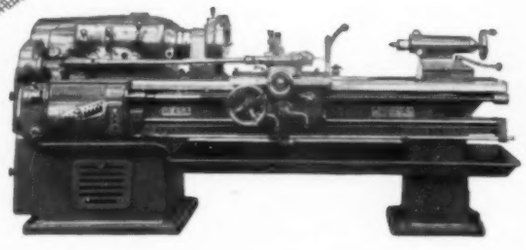
RPM CALOL

Trademarks Reg. U. S. Pat. Office

HERE'S A LEAD WORTH CHECKING..

... Worth checking to learn how easily threads with unusually long leads can be produced on the Hendey 16 x 54 lathe equipped with a Sub-Headstock. The six start worm shown above has a major diameter of 1-5/8" and a lead of 4". Producing a thread with such a long lead can impose severe strains on a lathe. Frequently, tolerances cannot be met. The Hendey lathe with Sub-Headstock avoids these problems by a unique gear arrangement. The Sub-Headstock driving plate revolves one turn to six turns of the lathe spindle. This reduces the load on the lathe to allow the chasing of threads with leads beyond the range given on the index plate.

Better check today on Hendey Precision lathes. They are manufactured in a wide range of sizes and capacities to suit every tool room use. Features include hardened and ground ways, preloaded roller bearing mounted spindles, precision lead screws and automatic lubrication. Write today for complete information.



HENDEY 18-SPEED 16 x 54 PRECISION LATHE

Other Hendey Machines Include
Tool Room Lathes — 9"- 12"- 14"- 16"- 18"- 20"- 24"
Shapers — 12"- 16"- 20"- 24"- 28"

THE *hendey* MACHINE COMPANY

MAIN OFFICE & PLANT: TORRINGTON, CONN.

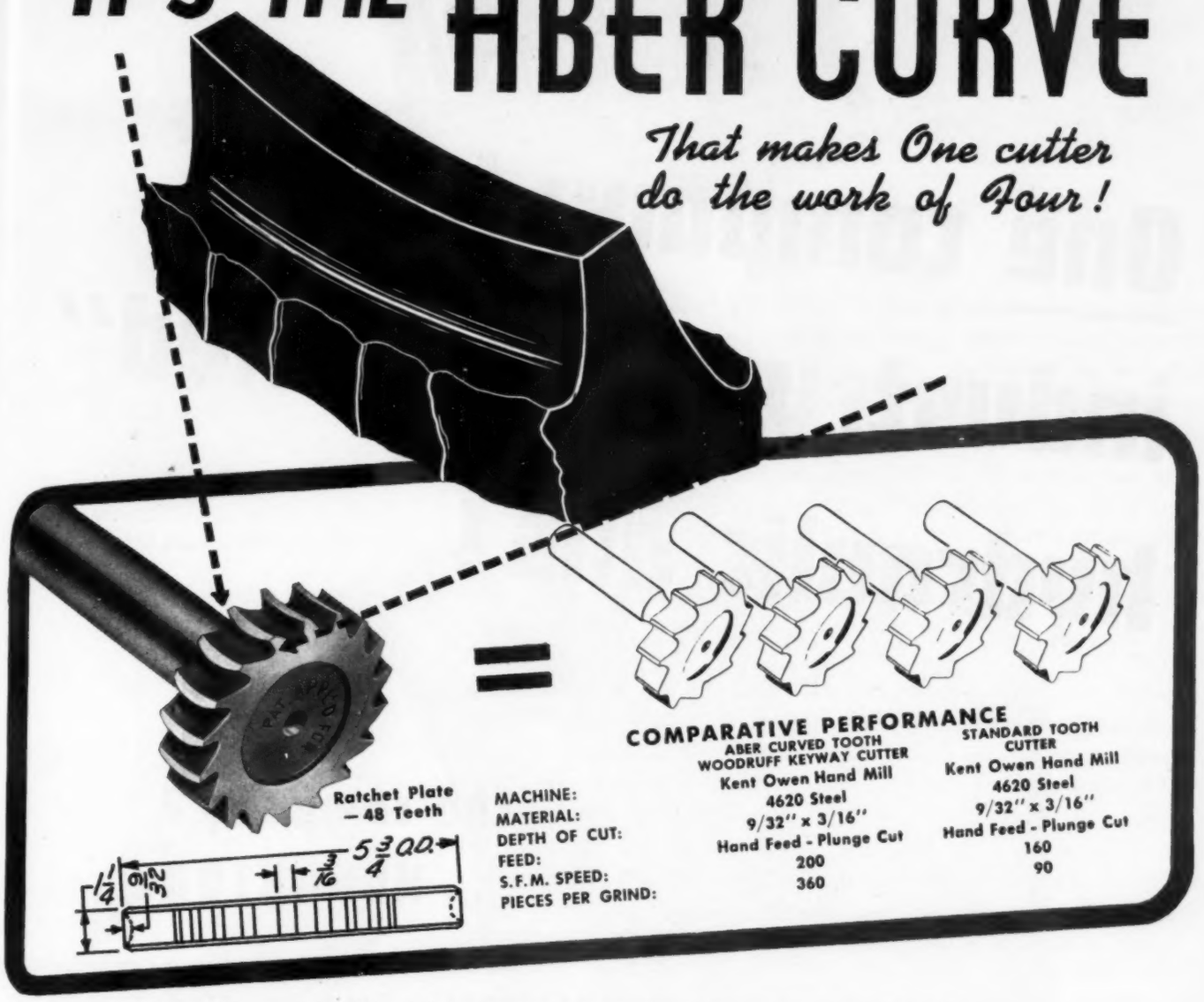
BRANCH OFFICES: New York, Chicago, Boston, Detroit, Rochester, Los Angeles, San Francisco

REPRESENTATIVES: Philadelphia, Cleveland, Pittsburgh

hendey

IT'S THE ABER CURVE

That makes One cutter do the work of Four!



COMPARATIVE PERFORMANCE

	ABER CURVED TOOTH WOODRUFF KEYWAY CUTTER	STANDARD TOOTH CUTTER
MACHINE:	Kent Owen Hand Mill	Kent Owen Hand Mill
MATERIAL:	4620 Steel	4620 Steel
DEPTH OF CUT:	9/32" x 3/16"	9/32" x 3/16"
FEED:	Hand Feed - Plunge Cut	Hand Feed - Plunge Cut
S.F.M. SPEED:	200	160
PIECES PER GRIND:	360	90

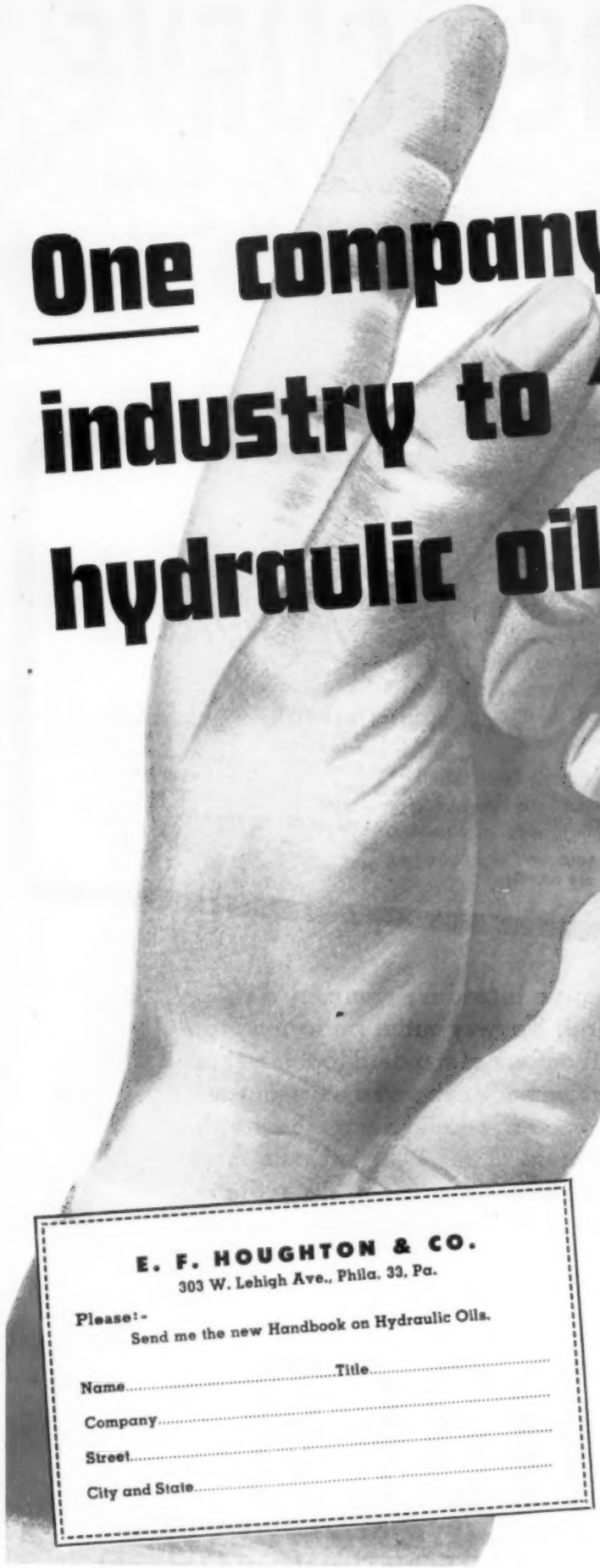
Yes, in an actual test in a large pipe threading company's shop, ONE Aber Curved Tooth Woodruff Keyway cutter performed the work ordinarily requiring FOUR cutters of standard tooth design. This 400% increase in cutter performance is by no means unusual, for Aber's exclusive curved tooth design permits a smoother finish, absence of chatter, greatly increased cutter life, and cuts more freely with far less hand pressure from the operator. In addition, it proved to be a tremendous saver of "down" time, and reduced costs in the cutter grind room.

Write today for your free copy of the new Aber Catalog, containing a wealth of information on the latest developments in the milling cutter field. A sound, practical guide to cutter buying.

ABER

ENGINEERING WORKS INC.
WATERFORD, WISCONSIN

One company led industry to "fortified" hydraulic oils!



The company? . . . HOUGHTON!

No other supplier of oils to be used as hydraulic media has done as much to fortify those oils for that service.

Houghton, over the past ten years, has perfected treatments of base oil stocks which (1) increased oxidation resistance, (2) improved gum solvency, (3) stepped up film strength and (4) provided resistance to corrosion dangers.

Today, industry recognizes this contribution to better hydraulic operation, and has constantly increased its purchases of hydraulic oils from Houghton in the past decade. When you have a need for hydraulic oils, please remember that it pays to use—

HOUGHTON'S HYDRO-DRIVE
Fortified
HYDRAULIC OILS

E. F. HOUGHTON & CO.
303 W. Lehigh Ave., Phila. 33, Pa.

Please:-
Send me the new Handbook on Hydraulic Oils.

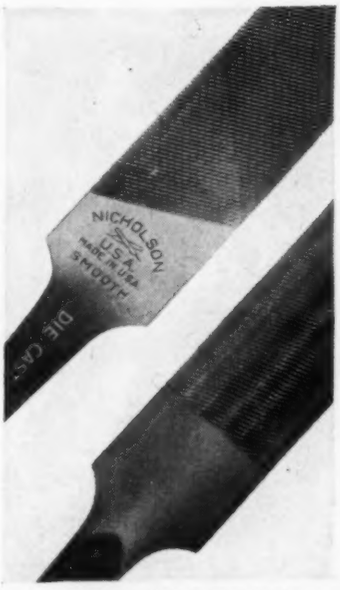
Name.....Title.....
Company.....
Street.....
City and State.....

"THE RIGHT FILE FOR THE JOB"

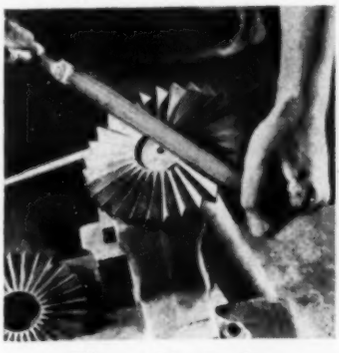
conserves materials, saves workmen's time, improves results—cuts production costs. This is one of a series of advertisements on special-purpose files. Save it, with the others, for shop and purchasing references.

Subject: FILES FOR DIE CASTINGS — **Prepared by Nicholson File Co.**

Mill Bastard Die Cast File



Half Round Die Cast File



Filing a Die Casting

FUNCTION OF DIE CAST FILES. Die castings of aluminum, magnesium or zinc alloy present special problems under which regular purpose files do not stand up as they should when removing webs, fins and flashing, or filing thin sections, sharp corners and edges. Regular purpose file teeth also have a tendency to clog up rapidly.

While Nicholson and Black Diamond Die Cast Files have the same number of teeth per inch as the regular Mill Bastard file, their teeth are specially shaped and sharpened to cut fast and without excessive clogging. Die Cast file teeth are also made extra strong on sides and edges to prevent their "shelling off" or "breaking out" under severe use against obstinate fins, corners or other projections.

POPULAR TYPES OF DIE CAST FILES. The Nicholson or Black Diamond Mill Bastard Die Cast File is single cut. The Half Round is double cut on its rounded side as well as on its flat side, thus permitting comparatively fast stock removal. But since it is made in Smooth instead of Bastard cut, it also produces a good finish.

HOW TO USE DIE CAST FILES. Light to medium pressure should be applied in filing small die castings; medium to heavy on large ones. A right-toward-left stroke generally should be used.

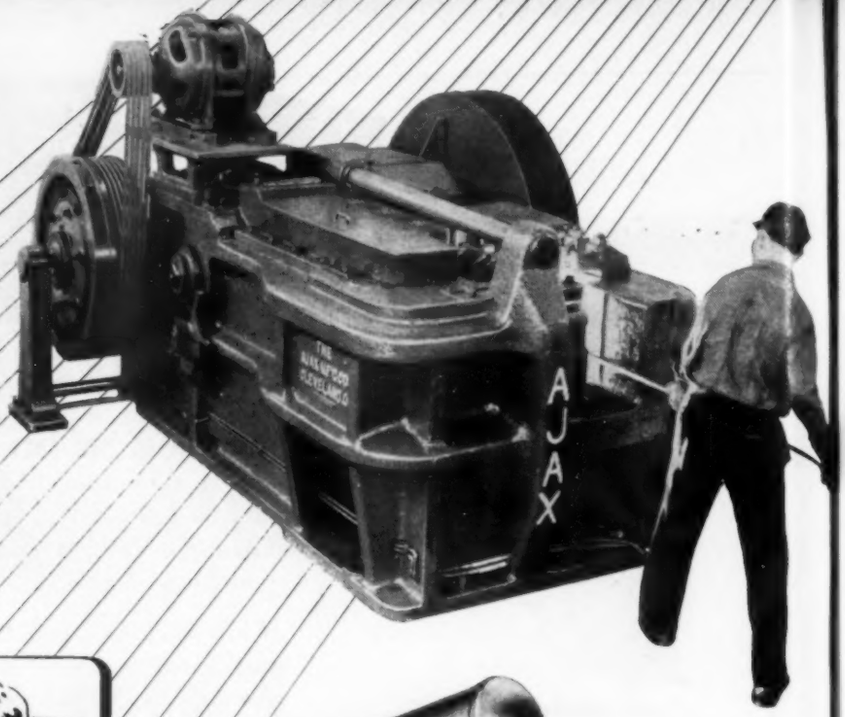
IDENTIFICATION AND SIZES. Nicholson and Black Diamond Die Cast Files are stamped "Die Cast" on tang. Regularly furnished in Mill Bastard and Half Round in 6", 8", 10", 12" and 14" lengths through your industrial distributor.

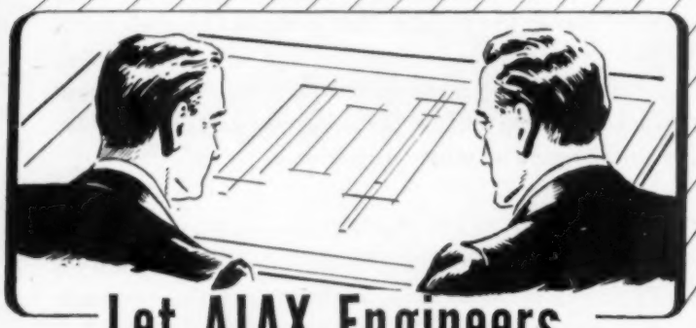
Nicholson makes special-purpose files for Brass, Lead, Aluminum, Stainless Steel, Foundry Castings, Die Castings, Die Making, Lathe Filing, Curved and Shear Tooth Filing—and Swiss Pattern files of all shapes and patterns.

FREE 48-PAGE BOOK, "*FILE FILOSOPHY*," tells about all of them, and includes valuable information about files in general. *Send for it.*

NICHOLSON FILE CO., 29 Acorn St., Providence 1, Rhode Island
(In Canada, Port Hope, Ont.)

NICHOLSON FILES *FOR EVERY PURPOSE*





Let AJAX Engineers Aid You In Selecting *Forging Machinery*

Ajax engineers, thoroughly experienced in forging processes and forging machinery, can be of valuable assistance to the persons responsible for efficient forging production.

The Ajax Manufacturing Company manufactures a complete line of forging machinery - - - Forging Machines, Forging Presses, Forging Rolls etc. Ajax engineers, with the knowledge gained through research and development within their plant and through constant contact with the most progressive forge plants in the country, are experts in the field of forging. Whether your problem concerns the selection of one piece of forging machinery for the forging of a single part, or a multiple unit production line set-up from bar stock to the trimmed forging, Ajax engineers will welcome the opportunity to assist you wherever possible.

THE **AJAX** MANUFACTURING COMPANY

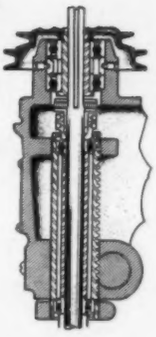
EUCLID BRANCH P. O. CLEVELAND 17, OHIO

110 S. DEARBORN ST. CHICAGO 3, ILLINOIS

DEWART BUILDING NEW LONDON, CONN.

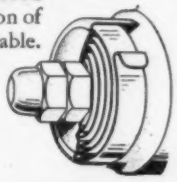
FOUR PRECISION BALL BEARINGS

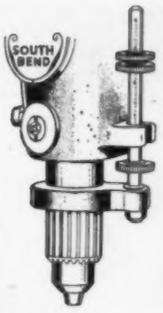
Two on spindle, two on drive sleeve. Pre-lubricated and sealed precision type, no oiling required.



ADJUSTABLE QUILL RETURN SPRING

Retracts quill instantly upon release of feed lever. Tension of spring adjustable.



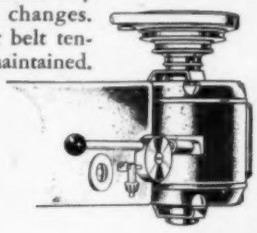


DEPTH GAUGE

Controls feed depth, length of return stroke, or locks spindle in any position. 16th graduations.

BELT TENSION RELEASE

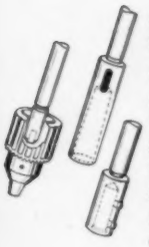
Flip of lever removes tension from belt for easy speed changes. Proper belt tension maintained.



BUILT-IN LIGHT

Provides shielded, shadowless illumination on work area. Independent on-off switch is built-in.

NEW! SOUTH BEND 14" Drill Press



INTERCHANGEABLE SPINDLES

Spindles available to take No. 2 Morse taper shank tools, and for 1/2" straight shank tools, router bits, shaper cutters, etc.

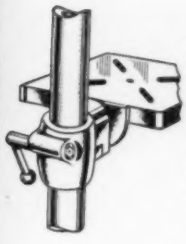
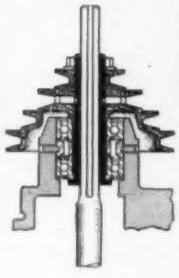


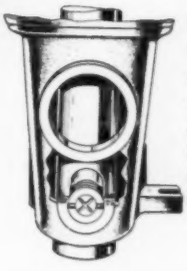
TABLE LOCK

Double-plug binder securely locks table to column. Eliminates misalignment. Column bearing is NOT split.

FREE-FLOATING SPINDLE

Design prevents misalignment, side thrust and whip. Precision splines in spindle and sleeve.





QUILL BEARING ADJUSTMENT

Shoe-type take-up provides feather-touch tension and secure locking. Quill bearing is NOT split.

CAPACITIES — SPECIFICATIONS

CAPACITY
Maximum drill size in iron or steel—½". Drills to center of 14¾" circle.

CHUCK
Capacity—0 to ½"

SPINDLE
Regular drill chuck type supplied.
Travel . . . . . 4"

CHUCK TO BASE DISTANCE
Bench Model—17"
Floor Model—46½"

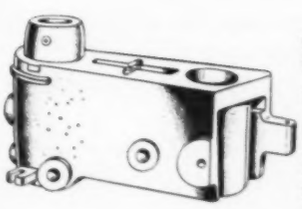
SPINDLE SPEEDS
Four—655 to 4530 r. p. m.

TABLE SIZE
10" x 10". Tilts to any angle.

Bench Model $129.30

Floor Model $144.30

Prices, f.o.b. factory, include drill chuck and 1/3 h. p., 115 or 230 v., 1 ph., 60 cycle motor and switch.



ONE-PIECE HEAD CASTING

Insures perfect alignment. Double-plug binder locks the head to column. Column bearing is NOT split.

SOUTH BEND LATHE WORKS

BUILDING BETTER TOOLS SINCE 1906 • 419 EAST MADISON ST., SOUTH BEND 22, INDIANA

A Great Seller

...because it's a Comfortable Eye-Protector!

AO F-9200 Acetate Goggle

When we brought it out, we were sure there was a great future ahead for this goggle of non-flammable cellulose acetate butyrate—but its popularity has surprised even ourselves! Here are its features that workers appreciate:

1. ASSURED PROTECTION.
2. Hinges and temples out of line of sight.
3. Smarter appearance.
4. Lenses that conform to and cover eye orbit.
5. Improved fit.
6. Comfortable, lightweight, face-formed bridge.
7. Nosepads which distribute goggle weight *evenly.*

This goggle does a prime protection job on operations in chemical and electrical plants where the tiniest spark might cause fire or explosion. Because of its acetate construction it is especially recommended for these and similar jobs where metal goggles might not be recommended. Available with ventilated side shields for added safety against lateral-striking objects. Lenses are 6-Curve Super Armorplate. When protection from glare, ultraviolet or infra-red radiations is a "must", specify Calobar lenses. For a handy source of supply, see the AO representative. There is always one near you.

Safety Division of American Optical COMPANY

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Steel-Weld FABRICATION

In the thirty ton gear housing, illustrated above, you see another typical example of Mahon workmanship in Steel-Weld Fabrication. Regardless of what your requirements might be—regardless of size, shape or weight, you will find in the Mahon organization a source for tailor-made weldments which offers every modern facility for economical production, processing, and complete machining. These modern facilities in the hands of highly skilled craftsmen, plus a staff of design engineering experts, is your assurance of a better, smoother appearing job, embodying every advantage of Steel-Weld Fabrication.

THE R. C. MAHON COMPANY

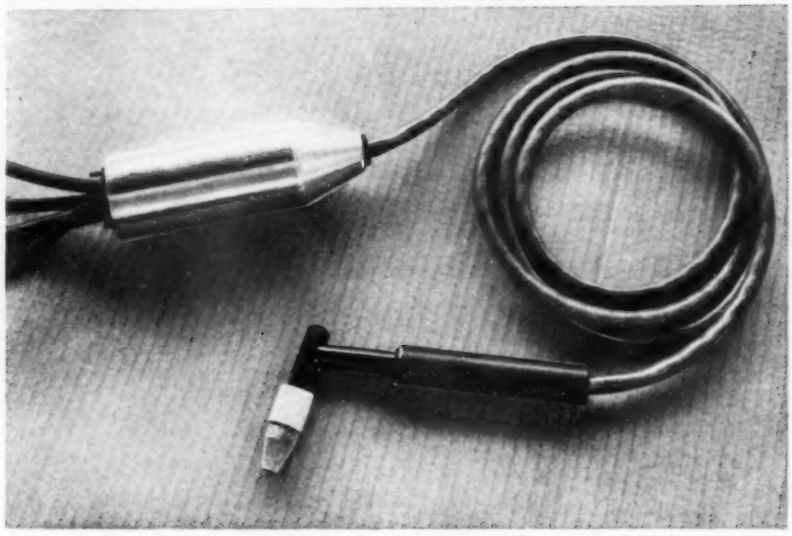
Detroit 11, Michigan

Engineers and Fabricators of Welded Steel Machine Bases and Frames, and Many Other Welded Steel Products

MAHON

Here it is!

THE NEW AIRCO WATER-COOLED ...MANUAL HELIWELD HOLDER



The NEW Airco manual Heliweld holder has been designed for continuous inert-gas-shielded-arc production welding. Its features include:

. . . a complete water cooling system

. . . all-plastic exterior insulation for maximum protection and efficient operation

. . . a gas cap made of light, non-conducting material

. . . extra-long, flexible cable, encased in a rugged, plastic cover

The NEW Airco manual Heliweld holder weighs about 28 ounces and has a current capacity of 300 amperes (AC or DC). It is fully insulated for high-frequency current—almost a "must" for arc-starting and welding stabilization.

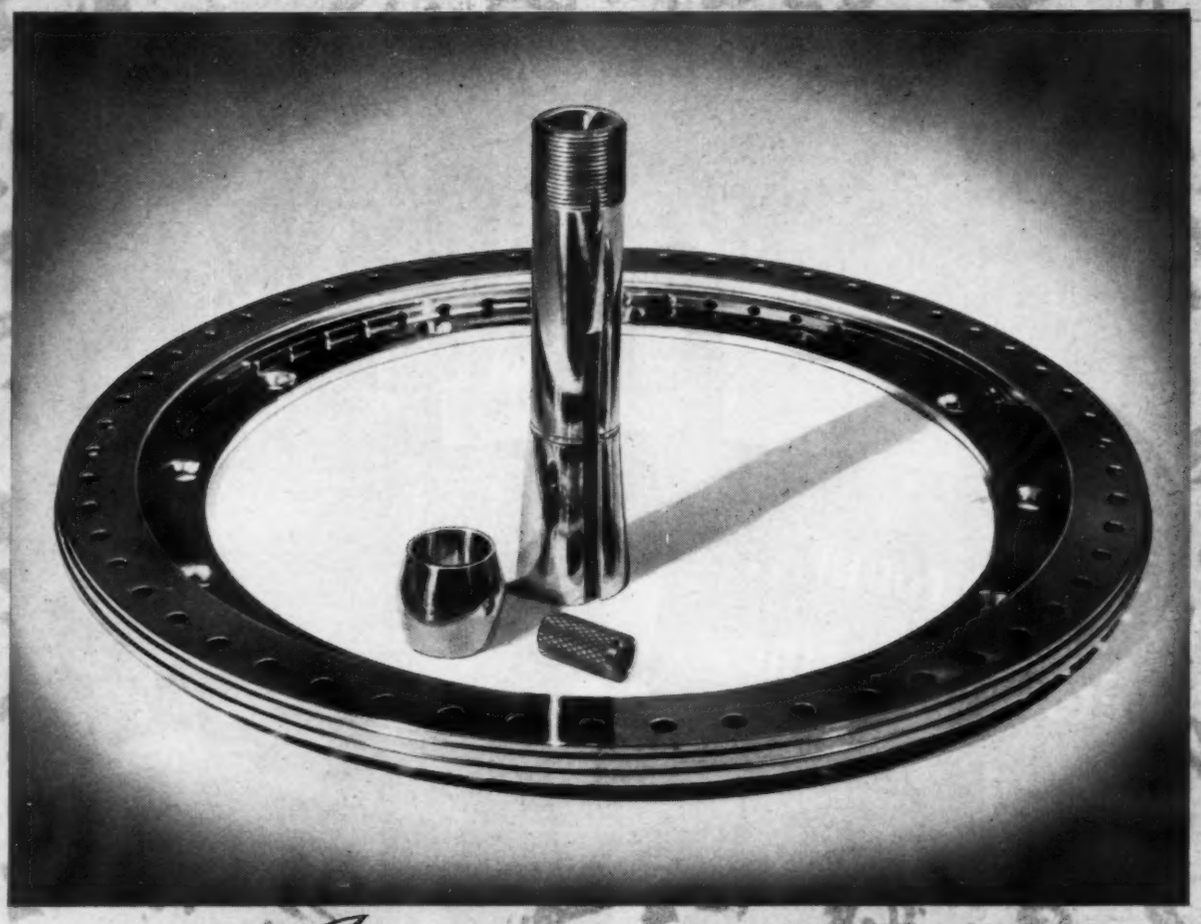
The water-cooling feature of this new holder is highly important. It extends almost to the point where the electrode is gripped, insuring an efficient, cool "hand-hold" at all times.

For further information about the NEW Airco manual Heliweld holder, write for booklet ADC-653; address: Dept. **AM-8742,** Air Reduction, 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas. On West Coast: Air Reduction Pacific Company, San Francisco 4, California.

AIRCO **AIR REDUCTION**

Offices in All Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases...Carbide...Gas Welding and Cutting Machines, Apparatus and Supplies...Arc Welders, Electrodes and Accessories



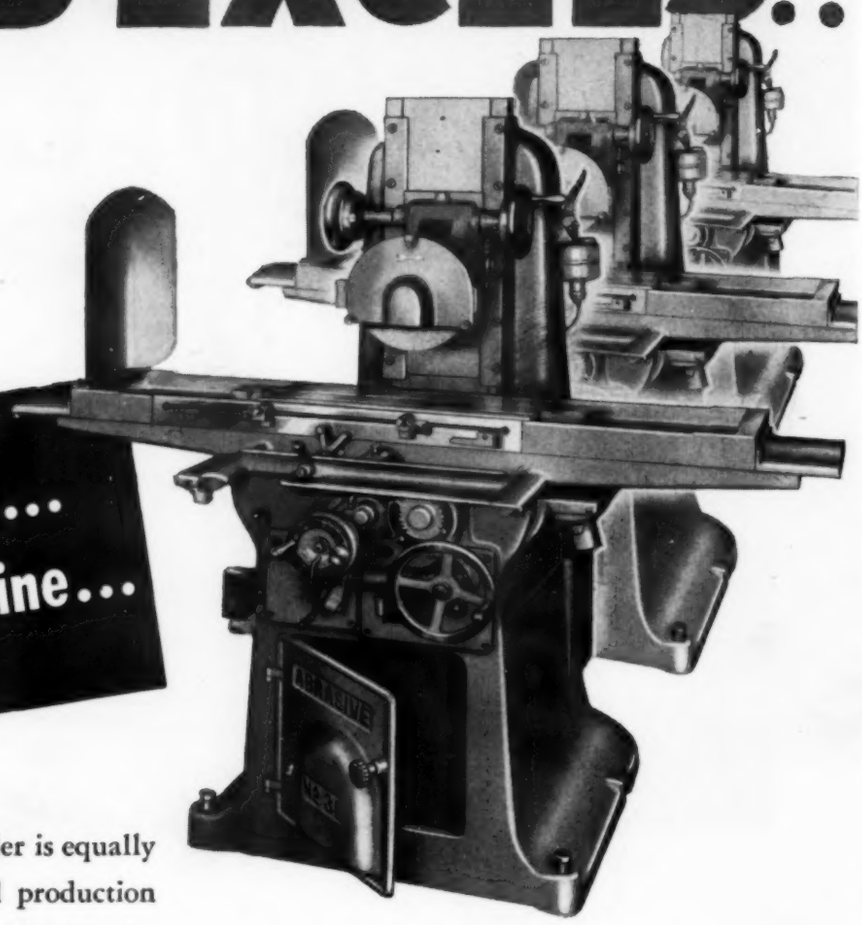
If limited space is your problem, the sleeve bearing requires less radial room than any other type. Every month millions of Bunting Cast Bronze Bearings go into service where space is so limited that a sleeve bearing is the only type capable of meeting the requirement. Our engineers are at your service. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches In Principal Cities.

Bunting

BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

40

The 3B EXCELS..



In the Toolroom... On Production Line...

The Abrasive 3B Surface Grinder is equally adapted for toolroom use and production line. With quick-change versatility it's the ideal flat grinder for jig, die, and gage making in the toolroom. On production runs, automatic longitudinal and transverse feeds speed the output of top-notch precision work ... the 3B meets heavy production schedules on time, all the time. Has large capacity: the 3B takes work up to 24" long, 8" wide, and 12" high. Massive bed construction, smooth running spindle and vibration-free table travel mean extreme accuracy and fine finish on every job.

Write for Bulletin.

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, RHODE ISLAND, U. S. A.

SPECIFICATIONS

Table size overall: 59" x 10½"

Spindle: 2290 R.P.M. Cartridge type

Drive: 3 H.P. motor

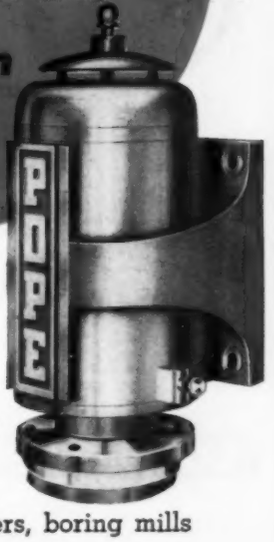
Wheel Size: 10" standard. 8" or 12" available on request

Net Weight: 2670 lbs.

ABRASIVE
ACCURACY BOOSTS PRODUCTION

YOUR SURFACE GRINDERS, PLANERS AND BORING MILLS DO BETTER WORK AND MORE OF IT PER DAY WHEN YOU EQUIP THEM WITH THESE . . .

POPE
PRECISION SPINDLES
with Sealed-In Lubrication



This POPE Direct Motorized Cartridge Type Spindle is for users of 6" x 18" Surface Grinders. It produces superior finishes, roughs off surplus metal fast, runs cool and delivers full 1 HP at the wheel.

Bulletin S-2 contains specifications and useful information about this and many other types of Pope Precision Spindles. *Write for it.*

This POPE Heavy Duty Motorized Spindle is for surface grinders, planers, boring mills and many other machine tools. It comes in sizes from ¾ HP to 20 HP and from 900 to 3600 RPM. It is available with flange or tapered nose for *quick mounting* of wheels or tools.

Catalog No. 58 contains all data for quick selection of the right Spindle and Wheel Holder or Cutter Head for your work. *Write for it.*

POPE

TRADE MARK REG. U.S. PAT. OFF.

POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

No. 53

WALTHAM SUB-PRESSES...

...for precision work

Arch Sub-Press

The cylindrical plungers in the Waltham Sub-presses slide in babbitted bearings. This bearing is tapered on the outside and can be forced downwards, thus reducing the inside diameter to fit the plunger when the latter becomes worn through use. Exact alignment and constant precision can be maintained throughout the life of the die. Write for information about the nine sizes.

Overhang Sub-Press

WALTHAM MACHINE WORKS
HIGH STREET, WALTHAM, MASS.

HALLOWELL
Steel Collars

Pat'd. &

Pats. Pend.

"Hallowell" Solid Steel Collars, functionally proportioned throughout, are precision-machined so faces run perfectly true . . . are also highly polished all over . . . yet they cost less than common cast iron collars; 3" bore and smaller are made from Solid Bar Stock and fitted with the famous "Unbrako" Knurled Point Self-Locking Socket Set Screw . . . a set screw that, once tightened holds and stays tight to make sure the collar won't shift on the shaft. "Hallowell" . . . a "buy word" in shaft collars . . . available in a full range of sizes for

IMMEDIATE DELIVERY

Ask for the name and address of your nearest "Unbrako" and "Hallowell" Industrial Distributor.

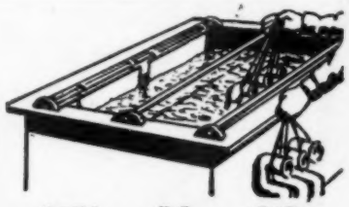
OVER 45 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PA. BOX 4

CHICAGO DETROIT INDIANAPOLIS ST. LOUIS SAN FRANCISCO

For anodic cleaning use Oakite Composition No. 90



YOU never know how good an electrocleaner can be until you watch Oakite Composition No. 90 go to work on oils, smuts, all the objectionable films that interfere with good electroplatin g on steel.

"No. 90" makes a well-balanced solution that has high conductivity, good wetting action, adequate buffering, every quality needed for good electrocleaning at low cost per unit. Even its bubbles are perfect—just strong enough to keep alkaline spray from being a nuisance around the tank; just brittle enough to prevent thick, explosive foaming.

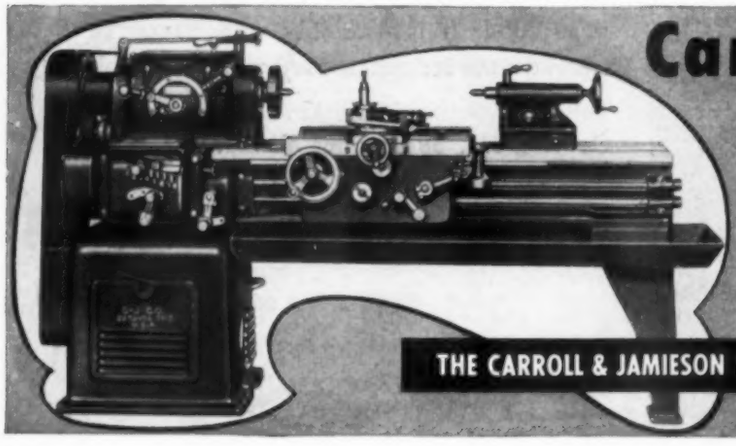
For a free demonstration of Oakite Composition No. 90, phone the Oakite Technical Service Representative in your vicinity or write to Oakite Products, Inc., 24 Thames St., New York 6, N. Y.

OAKITE

REG. U. S. PAT. OFF.

SPECIALIZED CLEANING MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. & Canada



Carroll & Jamieson
16" LATHE

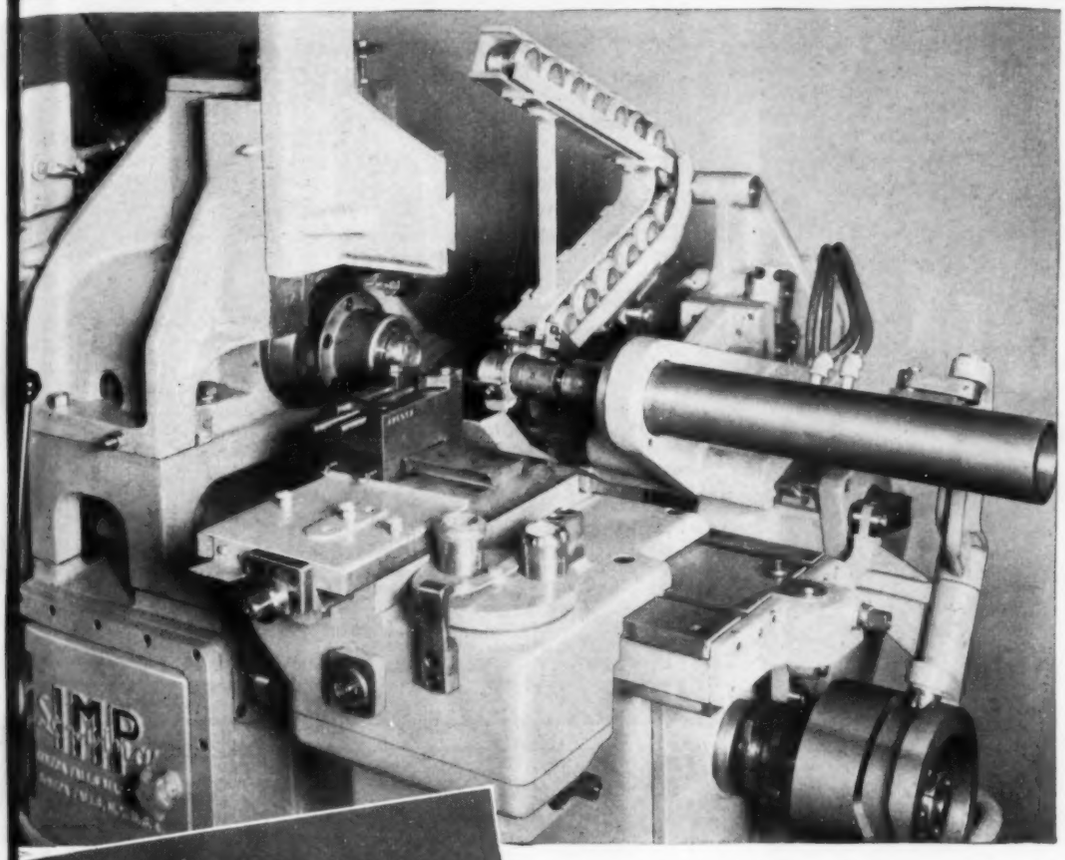
12 Speed Geared Head Motor Drive
Timken Mounted Spindle
Modern Design—
Liberal Dimensions

WRITE FOR BULLETIN

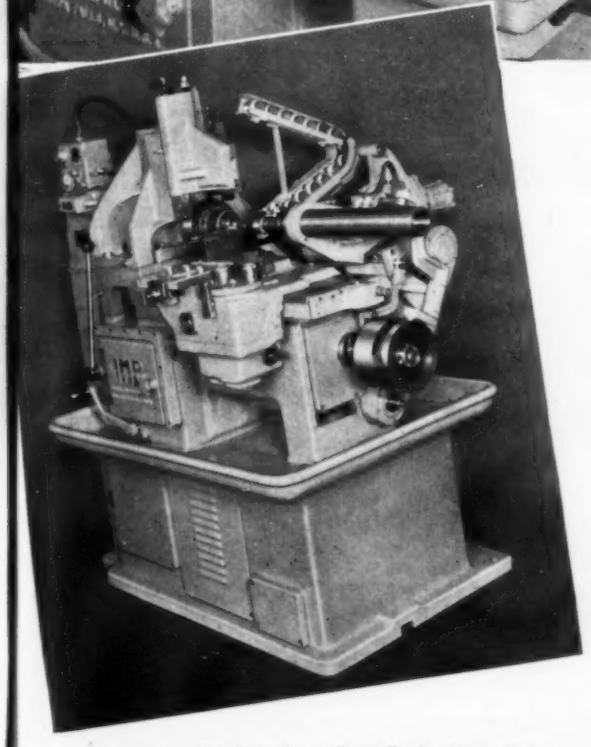
THE CARROLL & JAMIESON MACHINE TOOL CO., BATAVIA, OHIO, U. S. A.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



The close-up view of the machine shows the cams (covers removed) which operate the automatic loader and which assure perfect timing of all movements.



Lo-swing Lathes fitted with Automatic Loaders are usually grouped together in series of two or more as one operator can easily keep the loading chutes on several machines filled.

AUTOMATICALLY LOADED *Lo-swing* IMP

TURNS BRONZE COUPLINGS AT FAST RATE

Problem: To finish turn spherical end of bronze couplings. Operation consists of turning outside diameter, forming large radius, facing inside shoulder, and chamfering inside diameter.

Solution: The fully-automatic Lo-swing IMP Lathe selected for this job was fitted with a new type loader, designed for handling fairly heavy castings. The machine is entirely automatic. Bronze couplings which have been previously turned and threaded on the small end are placed in the loading chute and fed by gravity into a cradle where they are picked up by the injector head and chucked in an air-operated collet chuck. Turning of the O. D. and chamfering of the I. D. are accomplished with two tools mounted on the front slide, while squaring of the shoulder and forming of the radius are done with two tools mounted on the vertical slide. The finished piece is then automatically ejected and picked up by a safety finger which in turn drops it on the evacuation chute. The cycle is then repeated. A high hourly production is maintained due to the rapid operation of the automatic loader.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

ABBOTT

Insure PRODUCTS
AGAINST
BEARING BALL
BREAKDOWN

USE ABBOTT NOW

THE ABBOTT BALL COMPANY
HARTFORD 10, CONN.

The SUPER METHOD

of TRIMMING FORMED PARTS
and performing a host of other metal cutting jobs!

The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind. Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.

Write for Your Free Copy

FRICTION SAWING *with* Tannewitz
HIGH SPEED BAND SAWS

THE TANNEWITZ WORKS GRAND RAPIDS 4, MICHIGAN

3/4 SIZE

Severance CARBIDE MIDGET MILLS
Operate at grinding-wheel speeds
Outlast scores of mounted points
Cut 50 times faster
MANY SHAPES and SIZES
Cut hard materials - Rockwell 65-C
Write for Catalog No. 16
May be REGROUND time-after-time by Severance—savings are thus multiplied

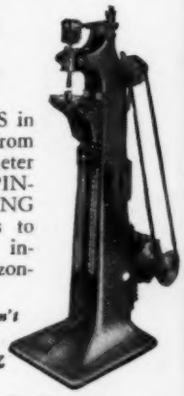
SEVERANCE TOOL INDUSTRIES, INC.
726 Iowa Ave., Saginaw, Michigan

GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to 5/8" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.



D.A. Stuart Oil CO.
EST. 1865 LIMITED
2729 SOUTH TROY STREET, CHICAGO 23, ILL.

STUART *service goes with every barrel*

For more profitable production

VARIABLE SPEEDS

MEET PRODUCTION "VARIABLES"

Fingertip speed control provides positive power at the correct production speed – faster or slower. Improved Sterling Speed-Trol gives you infinite speed control in a single, rugged, dependable power unit occupying one half the space formerly required – fits standardized motor mounting – incorporates V-Belt and proven engineering principles.

Improved STERLING
SPEED-TROL

SEND FOR NEW INFORMATIVE LITERATURE

SLOW SPEEDS

USE GEARED CONSTANT SPEED

There is no other known method of obtaining constant slow speed that is more efficient or economical in operation than this improved Sterling Slo-Speed motor. Sterling Slo-Speed motors with gears, motor and all parts, Sterling made into one rugged, compact unit, will give you long, dependable service at the "one best" constant production speed.

Improved STERLING
SLO-SPEED

SEND FOR NEW INFORMATIVE LITERATURE

Where constant normal speed is required, use the improved Sterling KLOSD; KLOSD-TITE FAN-COOLED; KLOSD-TITE ENCLOSED; KLOSD-FACE-MOUNTED electric power drives.

Thousands of satisfied, world-wide users are increasing plant profits with Sterling Speed-Trol and Sterling Slo-Speed motors.

STERLING ELECTRIC MOTORS

GENERAL OFFICES: LOS ANGELES 22, CALIFORNIA

New York 7 • Chicago 6 • Detroit 2 • San Francisco 5 • Philadelphia 7 • Boston 9
Seattle 4 • Cleveland 15 • Buffalo 3 • Pittsburgh • Cincinnati 2 • Atlanta 3 • St. Louis 8
Houston • Milwaukee 2 • Baltimore 2 • Memphis • Kansas City 2 • Dallas 1 • New Orleans 13 • Minneapolis 15

Canadian Sterling Electric, Ltd., Hamilton, Ontario, Canada

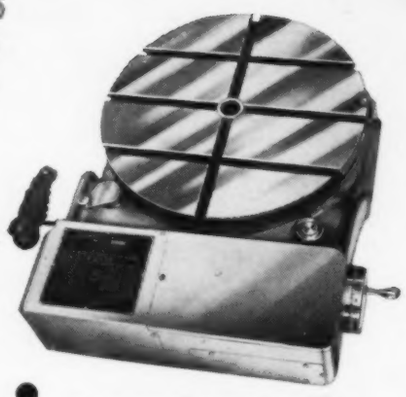
Representatives in Principal Cities and Foreign Countries

NEW!

KNIGHT EQUIPMENT
. . to Boost Output and Lower Costs

No. 50 PRECISION BORING AND VERTICAL MILLING MACHINE

Adaptable to an extreme variety of difficult jobs. Eliminates work transfers, reduces set-up time to a minimum. Combines advantages of both a solid base precision boring machine and rigid vertical miller. Unusual capacity. Fast and simple operation.

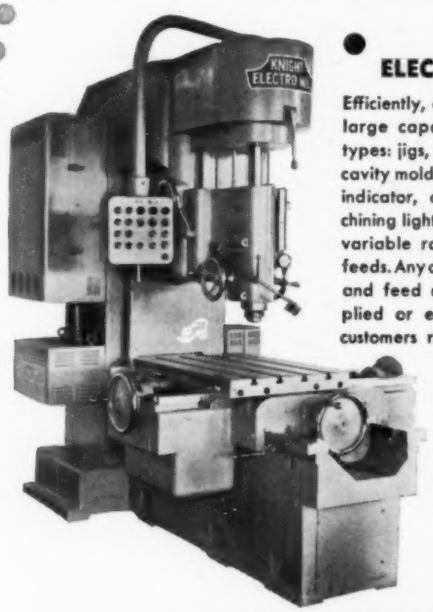


20" ROTARY TABLE

A self-contained motor-driven unit which adapts any milling machine for rotary milling or indexing. Eliminates set-up time. No installation — just plug into electric outlet. 18 Feed changes, 1½" to 54" or 3" to 108" per minute.

HOLE GRINDING ATTACHMENT

Accurately and quickly finishes holes and bores up to 6" diameter in hardened parts. Simplifies handling work too large to swing in standard machines. Special adaptors permit easy installation on any milling machine.



ELECTROMILL

Efficiently, economically handles large capacity work of many types: jigs, metal patterns, multi-cavity molds, jig boring with dial indicator, drilling, milling, machining light metals, etc. Infinitely variable range of speeds and feeds. Any combination of speeds and feed controls can be supplied or eliminated subject to customers requirements.

Write Today
for details and specifications

KNIGHT VERSATILE MILLERS ACCURATE • RIGID

W. B. KNIGHT
MACHINERY COMPANY

MORE GOODS for MORE PEOPLE at LOWER COST

3920 WEST PINE BLVD. • ST. LOUIS 8, MISSOURI

FREE LITERATURE

New Catalogs, Booklets, Bulletins

MACHINES AND ATTACHMENTS

1 PRESS-BRAKE DIE MANUAL—Verson Allsteel Press Co., Chicago 19, Ill. 88-page booklet, illustrated throughout, covers over 200 press-brake dies ranging from simple bending dies to complex gang-punching units. Also included is engineering data for making metal-forming calculations, and details and specifications on Verson press brakes.

2 HYDRAULIC SURFACE GRINDERS—Thompson Grinder Co., Springfield, Ohio. 32-page booklet is fully illustrated and indexed. Specifications, description, and facts on crush-form grinding and actual case histories of Thompson Truforming are included.

3 BOREAMING — Madison Mfg., Co., Muskegon, Mich. 32-page booklet covers Madison boring tools for inner diameters. Illustrations and specifications are given throughout. Tolerances as low as 0.002 can be held while cutting at high speeds.

4 DIE CASTING—Los Angeles Die Casting Co., Los Angeles 13, Calif. 8-page bulletin entitled "Improve Your Products" gives in a step-by-step picture and story treatment, the possibilities of producing parts with a high standard of uniformity by die casting systems.

5 ROLL FEEDS—Wittek Mfg. Co., Chicago, Ill. 24-page bulletin WF339 covers Wittek's automatic roll feeds for punch presses. Also included is information on Wittek's reel stand for strip stock or wire in coils.

6 MILL HEAD—Rusnok Tool Works, Chicago, Ill. 14-page bulletin well illustrated gives information on the Rusnok Model ST universal milling head. Various applications and specifications are included.

7 SHAPER—Sheldon Machine Co., Inc., Chicago 41, Ill. 16-page bulletin G-48 illustrates and describes the various models of Sheldon lathes, shapers, milling machines, and includes accessories and attachments.

8 GRINDING, POLISHING, DEBURRING—Hammond Machinery Builders, Inc., Kalamazoo, Mich. 18-page booklet 325 thoroughly illustrated covers the various type abrasive-felt and wheel-grinder polishing and deburring machinery manufactured by Hammond. Specifications are included on all models.

9 LATHE—Center Machine Works Co., Minneapolis 13, Minn. 8-page folder is entitled "Production Set-Ups for Minneapolis Basic Lathe." Illustrations of various applications are included.

10 CYLINDRICAL GRINDERS—Landis Tool Co., Waynesboro, Pa. 28-page catalog includes universal, roll, crankshaft, cam, valve, multiple-wheel and race grinders. Diagrams are used for explanations of design features. Machine applications are used throughout.

11 PRESSES—The Baldwin Locomotive Works, Eddystone, Pa. 12-page bulletin 285 and 286, illustrate and describe the line of Southwark presses and power tools. Various types of hydraulic presses ranging in capacity from 100 to 6000 tons for high-speed production and accurate forming of sheet metal parts are illustrated. Also illustrated are standard and custom-built steam-platen presses.

12 TOOLMAKERS' LATHES—Hauser Machine Tool Corp., Manhasset, N. Y. 24-page bulletin covers various toolmakers' lathes and accessories for headstocks, as well as attachments, made by Schaublin Ltd., Bevilard, Switzerland. Illustrations and specifications are included.

TOOLS AND ACCESSORIES

13 LAYOUT, INSPECTION EQUIPMENT—The Challenge Machinery Co., Grand Haven, Mich. 16-page bulletin 836 covers Challenge's precision equipment for tool and machine industries. Precision equipment for layout-, inspection-, assembly- and general production is included. Tables, benches, and various types of plates are offered.

14 MILLS, OTHER TOOLS—Genesee Mfg. Co., Inc., Rochester, N. Y.—64-page booklet spirally bound covers the company's line of adjustable hollow mills, facing and counterboring tools, and special production tools. Diagrams and specifications are included.

15 RADII, ANGLE DRESSERS—The J & S Tool Co., East Orange, N. J. 8-page pamphlet illustrates and describes modern form-dressing with Fluidmotion radii and angle dressers. Specifications are included.

16 GEAR TESTER—George Scherr Co., Inc., New York 12, N. Y. 10-page folder contains information on the various models of the Parkson Gear Tester in sizes ranging from 4½ to 36 in. in capacity. The 4½-in. model for spur, worm, and bevel gears is a new design.

17 MAGNETIC CHUCKS — Hanchett Mfg. Co., Big Rapids, Mich. 18-page folder 047-1 covers Hermeti-coil magnetic chucks and accessories. Illustrations and specifications are included.

18 SURFACE QUALITY CONTROL —Edward Blake Co., West Newton 65, Mass. 6-page folder 1048 discusses surface finishing standards for surface quality control and describes the Master set of machine cut surface-finish standards, consisting of 23 solid stainless steel specimens.

19 DIE-LESS DUPLICATING — O'Neil-Irwin Mfg. Co., Lake City, Minn. 40-page catalog, 48-14, includes new machines which have increased the scope of die-less duplicating. An explanation and outline of the free engineering service available from the company is given.

20 CHIP-BREAKER CHART—Wendt Sonis Co., Hannibal, Missouri. Wall chart with diagram, gives information on the recommended width of chip breaker, based on depth of cut and feed.

HEAT-TREATING AND WELDING

21 ARC-WELDING ELECTRODES—Wilson Welder & Metals Co., Inc., New York 17, N. Y. 40-page catalog contains 50 photographs and diagrams, an electrode selector chart, as well as information on all electrodes in the Wilson line. Welding procedure and mechanical properties are included.

22 FORGINGS—Champion Forge Co., Cleveland 5, Ohio. 12-page, two-color bbooklet entitled "Forgings, When You Want Them" is a pictorial review of the company's facilities. Data shows the wide range of quantity, weight, forgeable metals and types of forging produced by Champion.

Example

Name John Rodenick
Title Supt.
Company W. C. Davi Mfg. Co.
Co. Address 601 North St.
Brooklyn, 7, N. Y.
Fill in below number of ONE catalog wanted: 32
AMERICAN MACHINIST, New York

How to Order

1. If you are requesting four pieces or less, please use only the bottom card.
2. Be sure to fill one space for each booklet.
3. When you have filled out one card, detach stamp and mail.

Name
Title
Company
Co. Address
Fill in below number of ONE catalog wanted:
Not good after Jan. 1, 1949
AMERICAN MACHINIST, New York 10-21

Name
Title
Company
Co. Address
Fill in below number of ONE catalog wanted:
Not good after Jan. 1, 1949
AMERICAN MACHINIST, New York 10-21

Name
Title
Company
Co. Address
Fill in below number of ONE catalog wanted:
Not good after Jan. 1, 1949
AMERICAN MACHINIST, New York 10-21

Name
Title
Company
Co. Address
Fill in below number of ONE catalog wanted:
Not good after Jan. 1, 1949
AMERICAN MACHINIST, New York 10-21

Name
Title
Company
Co. Address
Fill in below number of ONE catalog wanted:
Not good after Jan. 1, 1949
AMERICAN MACHINIST, New York 10-21

Name
Title
Company
Co. Address
Fill in below number of ONE catalog wanted:
Not good after Jan. 1, 1949
AMERICAN MACHINIST, New York 10-21

Name
Title
Company
Co. Address
Fill in below number of ONE catalog wanted:
Not good after Jan. 1, 1949
AMERICAN MACHINIST, New York 10-21

FREE LITERATURE

AMERICAN MACHINIST
330 West 42nd Street
New York 18, N.Y.

Place Stamp Here

AMERICAN MACHINIST
330 West 42nd Street
New York 18, N.Y.

Place Stamp Here

23 SALT BATH FURNACES—Ajax Electric Co., Inc., Philadelphia 23, Pa. 4-page bulletin 122, describes the features of the new Ajax submerged electrode furnace. Furnace is designed for salt bath heat-treatment of work of unusual length and can be used for heat-treating in a temperature range of 300 to 2400 F.

24 WELDERS — Progressive Welder Co., Detroit 12, Mich. 8-page bulletin 804 describes a line of quick follow-up roller-head seam welders. The line is comprised of three basic sizes, each size being available in three types for circular welding, longitudinal welding, or both circular and longitudinal welding.

PLANT SERVICE EQUIPMENT

25 LOCOMOTIVE CANE — American Hoist and Derrick Co., St. Paul 1, Minn. 16-page bulletin 600-L-4 covers the American Diesielectric locomotive crane. Illustrated description of the various parts employed are given.

26 CLEANING—American Wheelabrator & Equipment Corp., Mishawaka, Ind. 24-page bulletin entitled "Cleaning Problems Solved" for the Automotive Industry is thoroughly illustrated and typical of bulletins available on such industries as foundries, forge shops, railroads, refrigeration, enameling, pumps, tools, and many others.

27 MOVING MATERIALS — Orton Crane & Shovel Co., Chicago 5, Ill. 24-page hard-cover book entitled "Moving Materials from Here to There" is designed for solving special materials handling problems. Various case histories are discussed.

28 METAL PRODUCT CLEANING—Alvey-Ferguson Co., Cincinnati 9, Ohio. 28-page, two-color book takes the reader through the process of "what to look for" when selecting a washing machine. A section is devoted to completely coordinated Conveyorized systems.

PARTS AND MATERIALS

29 VALVES, STRAINERS, HEAT-CONTROLS—A. W. Cash Valve Mfg. Corp., Decatur, Ill. 32-page booklet B-14 covers the Cash-Acme line of automatic pressure-reducing valves, strainers, hot-water heat controls, and relief valves. Specifications and drawings are included.

30 GRINDING WITH OIL—D. A. Stuart Oil Co., Ltd., Chicago 23, Ill. 20-page revised edition of company's catalog and handbook on grinding information has been revamped to keep the metal-working industries abreast of rapid changes in grinding with oil. Applications of oil to precision grinding projects is discussed.

31 SPINDLES—Pope Machinery Corporation, Haverhill, Mass. 64-page catalog 58 spirally bound covers the Pope series P-2500 heavy-duty motorized spindles. Specifications and drawings are included.

32 CLUTCHES—Morse Chain Co., Detroit 8, Mich. 16-page, two-color catalog C11-48 covers the new Morse-Formsprag clutch. Construction development and working principle of the full-complement over-running clutch is described. Clutches are available in all-purpose, indexing, and plain-bearing types.

33 FASTENINGS—The H. M. Harper Co., Chicago 18, Ill. 30-page catalog illustrates and describes bolts, nuts, screws, washers, riveters and accessories made in brass, naval bronze, silicon bronze, monel metal and stainless steels. Specifications on all items are included.

34 SCOTCH TAPES—Minnesota Mining & Mfg. Co., St. Paul 6, Minn. 24-page booklet covers the various types of Scotch tapes for masking, protecting, holding, sealing, reinforcing, splicing, identifying and sand blasting. Booklet is thoroughly illustrated.

35 BONDERIZING — Parker Rust Proof Co., Detroit 11, Mich. 44-page booklet A-1221 describes Bonderizing, a Parker process that holds paint to metal and resists corrosion. Application of the process is discussed.

36 FIXTURE CLAMPS—Morton Machine Works, Ferndale 20, Mich. 45-page folder contains a complete set of Loose-Leaf tracing templets for the M-T fixture clamps.

37 BAR STEEL—Republic Steel Corporation, Cleveland 4, Ohio. 28-page booklet describing cold-finished steel bars includes typical uses and mechanical properties of the types most frequently used.

38 PACKING MANUAL — Sherman Paper Products Corporation, Newton Upper Falls 64, Mass. Bound folder includes various samples of flexible corrugated materials. Descriptive material including properties and specifications are included.

39 COLLETS—Sheffer Collet Co., Traverse City, Mich. 18-page folder 45 covers collets and stock pushers for all types and sizes of automatic and hand screw machines, special collets, collets for lathes, milling machines and others. Illustrations and specifications are included.

40 MEEHANITE METAL—Meehanite Metal Corp., New Rochelle, N. Y. 8-page bulletin 27 is entitled "Design Data Formulas and Charts for Computing Maximum Stresses in Angles, Ribbed Plates, and Shear Resistant Webs Containing Cut-Outs". A supplement provides typical examples of applications of the data with specific references to the bulletin's contents.

41 MICROSPHERE BEARINGS — Landis Tool Co., Waynesboro, Pa. 12-page booklet explains the basic fundamentals of the Microsphere wheel spindle bearing used exclusively on Landis Tool Precision Grinders.

42 FASTENERS — Simmons Fastener Corp., Albany, N. Y. 4-page bulletin illustrates applications of the Simmons line of quick-lock, spring-lock, and lock-nut fasteners. The spring-lock is a one-piece blind fastener.

43 PUMPS — Allis-Chalmers, Milwaukee, Wis. 8-page bulletin, 32B6975 covers coolant circulating pumps and contains dimensions, head capacity, tables, construction and application information.

44 FREE-CUTTING MACHINERY STEEL—Joseph T. Ryerson & Son, Inc., Chicago 80, Ill. 4-page bulletin describes Rytense AA, a medium carbon-manganese free-cutting machinery steel. Bulletin contains figures showing strength, machinability rating, typical analysis, mechanical properties, and hardness at various tempering temperatures.

45 TRAPS, FLOATS, VALVES — W. H. Nicholson & Co., Wilkes-Barre, Pa. 8-page bulletin 1248 gives capacities, features and applications, as well as construction details of these various products.

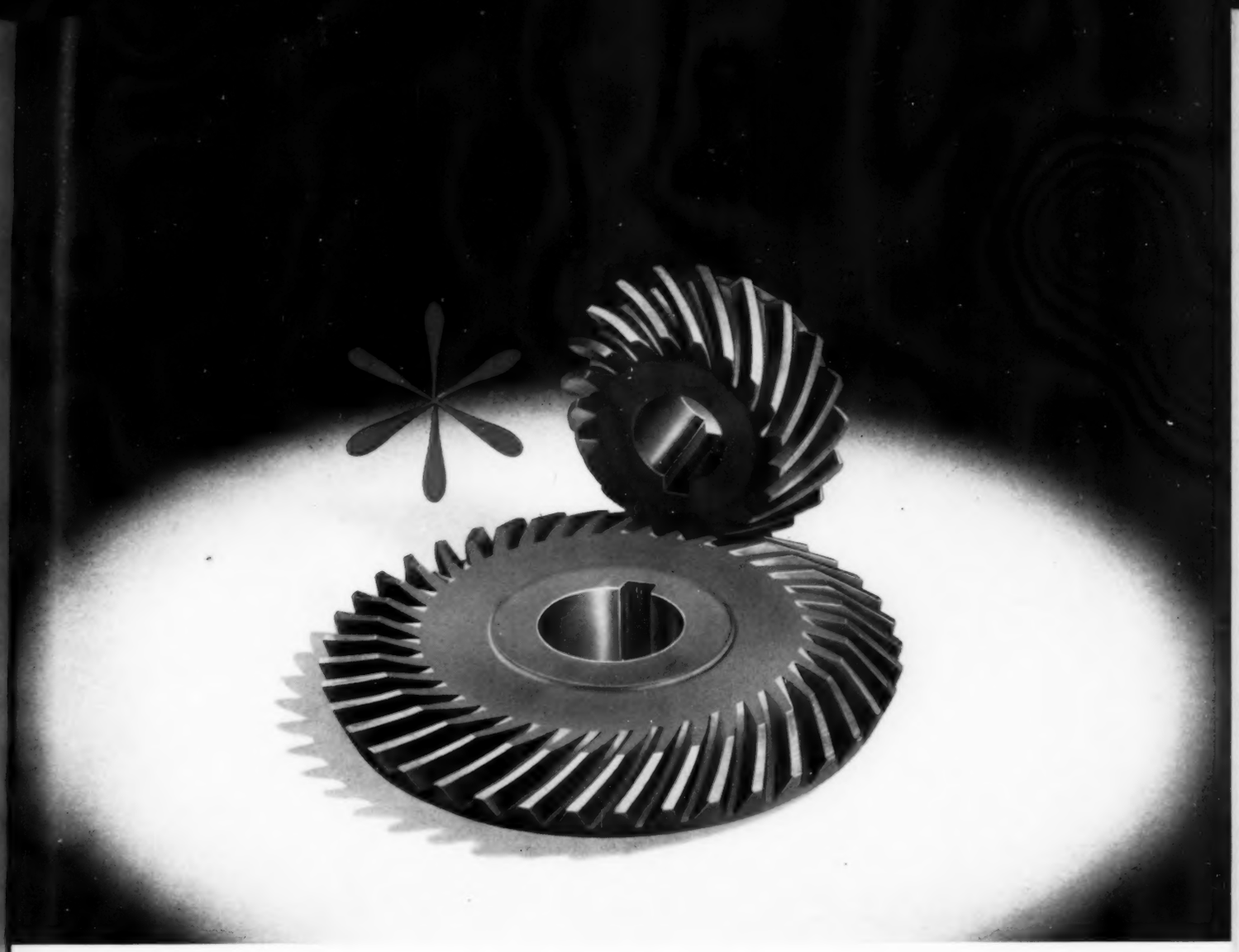
46 ELECTRIC MOTORS—The Lima Electric Motor Co., Lima, Ohio. 6-page bulletin MB-1 covers the Lima Motor, multiple-speed gear shift drives, pedestal grinders, and polishing and buffing lathes.

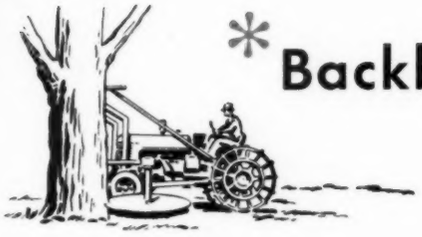
47 CAST IRON PULLEYS — Pyott Foundry & Machine Co., Chicago 7, Ill. 10-page pamphlet 60 contains a description of the various types of machine-molded cast-iron pulleys. Complete specifications are given.

48 COPPER-BASE ALLOYS — Fansteel Metallurgical Corporation, North Chicago, Ill. 14 pages of data cover five copper-base alloys for electrical and mechanical operations other than resistance welding. These alloys are described in five technical data bulletins. All of the Fansteel copper base alloys are available in bars, rods, slabs, sheet, coiled strip and fabricated parts.

MISCELLANEOUS

49 CENTENNIAL BOOKLET — Farrel-Birmingham Co., Inc., Ansonia, Conn. 32-page booklet commemorates the 100th anniversary of the founding of the company's plant in Ansonia, Conn. Present-day status of the company and historical data are included. Free-hand sketches of plant scenes and company products are incorporated.





* Backbone for a modern Paul Bunyan

The fabled Mr. Bunyan was quite a lumberjack, but even he would be no match for the mighty power saws that literally wade through brush and timber. As you can imagine, these modern giants must be extraordinarily rugged for month-in, month-out service at all kinds of cutting and clearing. That they are rugged is due in small part at least, to the simple pair of gears shown above.

These gears are no unique example of the gear-making art. In fact, they're rather typical of many thousands of sets annually made at Automotive Gear. *Their distinction is simply that they do so well the work they are designed to do.*

And that, in the final analysis, is what gears are for. To work. Simple or complex. Large or small. The final appraisal concerns performance. How well do they do the job? That is a question we like you to ask about Double Diamond gears. Into them go good engineering, excellent manufacturing and inspection facilities, more than twenty-five years of gear-making skill. Well and good. But what is more important, the way they are made pays off in the way they perform. They do very well the work that you want them to do.

If you would like more facts about Double Diamonds, why not let us discuss your next gear problem—either by mail or personal visit?

DOUBLE DIAMOND
TRADE MARK
GEARS

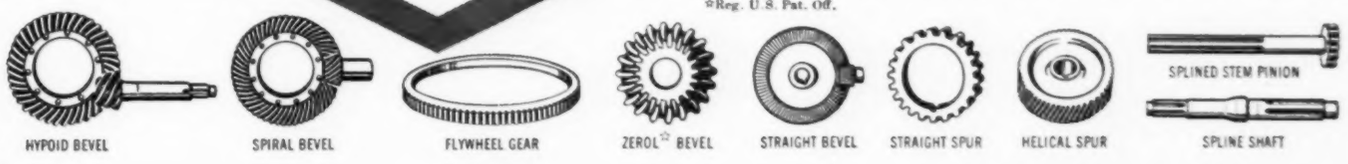
Made by

Automotive Gear Works, Inc.

RICHMOND, INDIANA

• • • • FOR AUTOMOTIVE FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS • • • •

*Reg. U.S. Pat. Off.

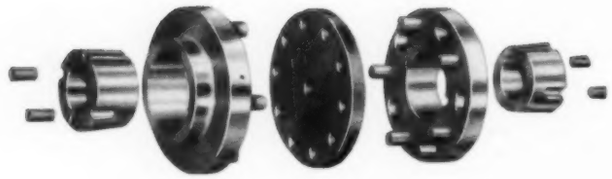


HYPOID BEVEL · SPIRAL BEVEL · FLYWHEEL GEAR · ZEROL* BEVEL · STRAIGHT BEVEL · STRAIGHT SPUR · HELICAL SPUR · SPLINE SHAFT

NOW! TAPER-LOCK* FLEXIBLE COUPLING!

It's new! It's different! A packaged Flexible Coupling . . . available from stock . . . and ready to install *without reboring.* It's another Dodge development for mechanical power transmission that saves time, cuts cost!

* TRADE MARK REGISTERED U.S. PAT. OFF.



- ✓ Built with the famous TAPER-LOCK bushing (patented).
- ✓ Available from stock in a wide range of standard bores. *No reboring!*
- ✓ Fastens to shaft with the firmness of a shrunk-on fit.
- ✓ Easy on—easy off. Can be disconnected without moving coupled machines.
- ✓ Compact design occupies minimum space on shaft. Safe! No projecting parts.
- ✓ "Pin Type" design with oak tanned sole leather center disc provides flexibility, resiliency and strength.
- ✓ Made of close grained semi-steel and machined all over to insure balance and true running.

DODGE MANUFACTURING CORPORATION
MISHAWAKA, INDIANA

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER

(or write the factory) for complete bulletin on this newest Dodge contribution to better mechanical transmission of power. The Transmissioneer—your local Dodge distributor—is a factory trained specialist. Look for his name under "Power Transmission Equipment" in your classified phone book.

Copyright, 1948, Dodge Mfg. Corp.

NAME PLATES

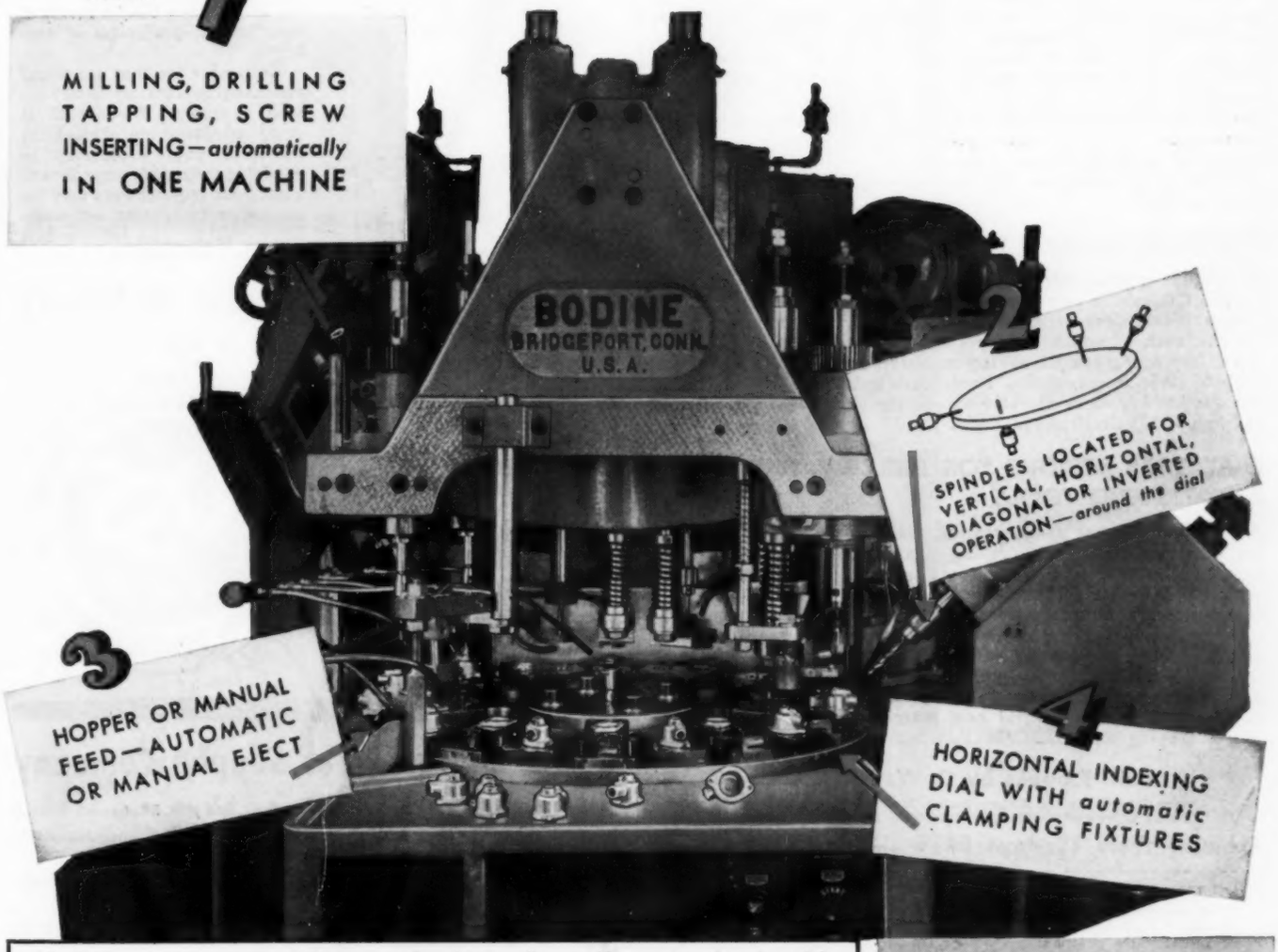
FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY,
ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

"Wanta make something out of it ?"...

...Get a Bodine

YOU CAN HAVE

1 MILLING, DRILLING TAPPING, SCREW INSERTING—*automatically* IN ONE MACHINE



2 SPINDLES LOCATED FOR VERTICAL, HORIZONTAL, DIAGONAL OR INVERTED OPERATION—*around the dial*

3 HOPPER OR MANUAL FEED—AUTOMATIC OR MANUAL EJECT

4 HORIZONTAL INDEXING DIAL WITH *automatic* CLAMPING FIXTURES

If you require repetitive production of small parts check with BODINE ENGINEERS. Six sizes, tooled to your specific job... for high speed, low cost processing.

"You can't meet tomorrow's competition with yesterday's machine tools."

SEND FOR BULLETIN AM

THE **Bodine** CORPORATION

BRIDGEPORT 8 CONNECTICUT

AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

7BD48

3 *important* books on TOOL DESIGN

written for you by an expert

TOOL DESIGNERS will tell you that *every* book on tool engineering by C. W. Hinman is a

"MUST"

See them 10 days FREE

DIE ENGINEERING LAYOUTS AND FORMULAS

A practical toolroom engineer brings you in this book the gist of his *40 years' experience* in interchangeable manufacture. Here are drawings and photographs with detailed explanatory text of 90 percent of all the key designs used in tools for presswork. Includes all the necessary mathematical formulas for laying out the assembled dies in a clearly rendered drafting technique—shows dies for producing equipment that reveals basic principles of many key designs that have wide application in fabricating an endless variety of small precision parts—shows you the drafting short-cuts that war production has worked out. *497 pages, 311 illustrations, $5.50.*

PRESSWORKING OF METALS

A valuable reference for the design of press tools and the fabrication of metals in power presses—a reliable source for everyday use on bench, desk or drawing board. Gives numbers of basic designs, each of which embodies the means of simplifying presswork, improving results, saving material, cutting costs, or accomplishing difficult operations. From them toolmakers and designers can get endless ideas for solving specific problems of their own. *443 pages, 423 illustrations, $4.50.*

PRACTICAL DESIGNS FOR DRILLING, MILLING AND TAPPING TOOLS

A practical manual demonstrating the best methods for designing, drafting, and using drilling jigs, and tapping and milling fixtures, illustrating the fundamental principles by which all tools must be designed for successful operation. With a wealth of detailed operational functions of tools, mathematical formulas, tool engineering tables, etc., it supplies all the essentials of designing and drafting tools and gives many new ideas for doing machine work and for designing tools. This thoroughly revised edition presents much data on recently improved production techniques and includes helpful new material on the most effective use of tapping tools. *2nd Ed., 416 pages, 446 illustrations, $4.50.*

***All 3 books by* C. W. HINMAN**

Former Chief of Jig and Fixture Design, Western Electric Co., Chicago; former Chief Tool Engineer, Automatic Electric Company, Chicago.

Examine them 10 days FREE — Mail this coupon!

McGRAW-HILL BOOK CO., INC., 330 W. 42nd ST., NEW YORK 18, N. Y.

Send me the books checked below for 10 days' examination on approval. In 10 days I will pay for the books, plus few cents postage or return them postpaid.*

- ☐ Hinman—Die Engineering Layouts and Formulas, $5.50.
- ☐ Hinman—Pressworking of Metals, $4.50.
- ☐ Hinman—Practical Designs for Drilling, Milling and Tapping Tools, $4.50.

Name .....

Address .....

City .....Zone.....State.....

Company .....

Position A-10-21-48

**SAVE: We pay postage and packing charges if you send cash with your order. Same return privilege.*

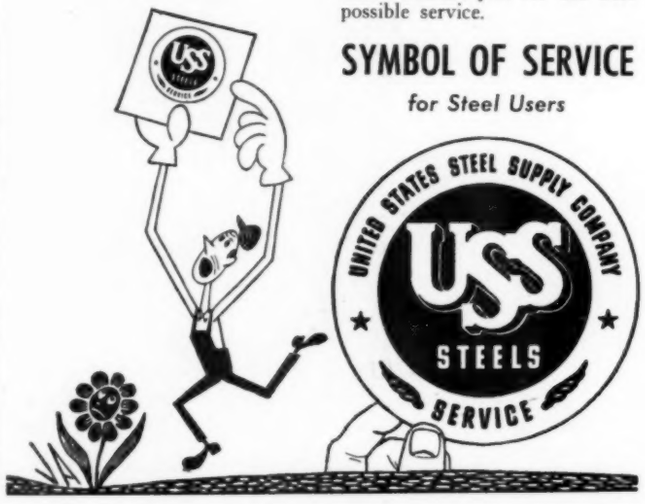
If you need STEEL—don't give up

-call us first!

As long as various sizes, types and grades of steel continue to be in short supply, we offer you this assurance . . . if you call us, we'll certainly make an all-out effort to take care of your requirements from one or the other of our eleven conveniently located warehouses.

It may be good news to you that our stocks of Stainless Steel bars, plates, sheets, pipe and tubing are now adequate to meet your everyday requirements. Alloy and High Strength Steels are also making their way out of the "hard-to-get" class of material.

Remember too that our stocks are changing from day to day . . . steel is coming in—as well as going out. Items out of stock the last time you called, may be available today. So, regardless of what your requirements may be, remember to contact our warehouse nearest you for the best possible service.



SYMBOL OF SERVICE

for Steel Users

United States Steel Supply Company

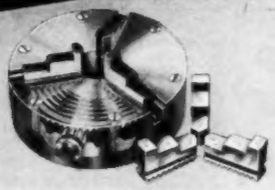
CHICAGO (90)	1319 Wabansia Ave., P. O. Box MM	BRunswick 8-2000
BALTIMORE (3)	Bush & Wicomico Sts., P. O. Box 2036	EDmondson 4900
BOSTON	176 Lincoln St., (Allston 34), P. O. Box 42	STadium 2-9400
CLEVELAND (14)	1394 East 39th St.	HEnderson 5750
LOS ANGELES (54)	2087 East Slauson Avenue P. O. Box 2826—Terminal Annex	LAfayette 0102
MILWAUKEE (1)	4027 West Scott St., P. O. Box 2045	Mitchell 5-7500
NEWARK (1), N. J.	Foot of Bessemer St., P. O. Box 479	Bigelow 3-5920 REctor 2-6560—BErgen 3-1614
PITTSBURGH (12)	1281 Reedsdale St., N. S.	ALlegheny 4200
ST. LOUIS (3)	311 S. Sarah St., P. O. Box 27	LUcas 0440
SAN FRANCISCO (1)	1940 Harrison St., P. O. Box 368	MArket 1-4988
TWIN CITY	2545 University Ave., St. Paul (4), Minn.	NEstor 7311

UNITED STATES STEEL

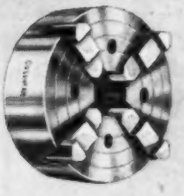
A WORLD STANDARD FOR PRECISION

No matter what your Work Holding Problem . . .
consult
CUSHMAN

Light Duty

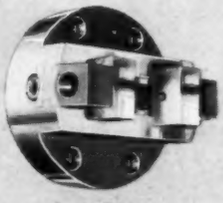


3 JAW
SELF-CENTERING

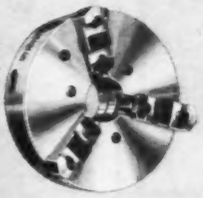


4 JAW
INDEPENDENT

Medium Duty



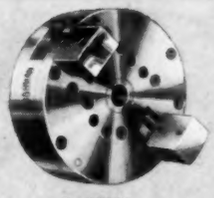
2 JAW
SELF-CENTERING



3 JAW
SELF-CENTERING

4 JAW
INDEPENDENT

Heavy Duty

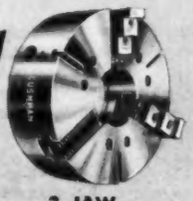


2 JAW
SELF-CENTERING

3 JAW
SELF-CENTERING

4 JAW
INDEPENDENT

Extra Heavy Duty



3 JAW
SELF-CENTERING

4 JAW
INDEPENDENT

Cushman Chucks are now being made in a wide range of types, sizes and jaw specifications for mounting on American Standard Type A-1, Cam-lock Type D-1 and Long Taper Key Drive Spindle noses, as well as for use on threaded spindles, using adapter plates. The right chuck with the right jaw equipment can help you reduce machining costs. Consult us.

THE CUSHMAN CHUCK COMPANY
HARTFORD 2, CONN.

Comprehensive Series of
CUSHMAN POWER CHUCKS
and
AIR CYLINDERS
are now available.
Write for Catalog PO63 and Bulletins

Consult
CUSHMAN

Chucking Engineers Since 1862

GANSCHOW CUT GEARS

SPUR—SPIRAL
BEVEL—RACK
AND PINION

UP TO 60" PITCH DIA.
UP TO 10" FACE WIDTH

GANSCHOW GEAR CO. • 14 N. MORGAN ST., CHICAGO 7.

GEAR CUTTING MACHINES

Well Designed
Good Features
Create Production Advantages

43 Years' Experience

NEWARK GEAR CUTTING MACHINE CO.
69 Prospect Street, NEWARK 5, NEW JERSEY
FRANK E. EBERHARDT, *President*

QUALITY GEARS CUT TO ORDER

• MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance and economy be possible. Tell us what you expect it to do, and we'll show you the one gear suited for your job.

MEISEL PRESS MFG. CO.
[illegible] Boston, Mass.

Switch to
GENUINE PITTSBURGH LINE OF
ARMORED CRANE GEARS and WHEELS

ARMORED AGAINST
WEAR • BREAKAGE • SHOCK
★
Wheel Treads and Flanges Armored to 601-712 Bhn. for Extra Hardness and Longer Life.

ARMORED CRANE WHEELS

PROMPT DELIVERIES

PITTSBURGH GEAR COMPANY | 27th & Smallman Streets, PITTSBURGH 22, PA.

QUALITY GEARS FOR OVER 30 YEARS

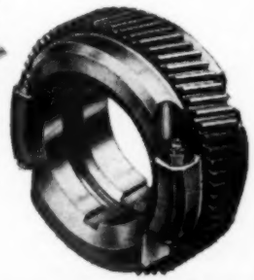
A GOOD HABIT *to* GET INTO...!

We of the Cincinnati Gear Company believe our responsibility to industry goes beyond the production of GEARS, GOOD GEARS ONLY. The ultimate use of these gears is equally important to us.

We of the Cincinnati Gear Company are specialists in the manufacture of gears to meet specific needs. Our modern plant is equipped with the finest and most accurate equipment for the control and production of GOOD gears.

For distinguished service in job performance let Cincinnati Gears, Good Gears Only, work for you . . . it is a good habit to get into.

★ SPUR
★ BEVEL
★ HELICAL
★ SPLINE
★ WORM
★ SPECIAL



THE CINCINNATI GEAR COMPANY
"Gears . . . Good Gears Only"
Wooster Pike and Mariemont Ave. ★ Cincinnati 27, Ohio

GEARS
CAMS
THREAD GRINDING
Any size or shape to utmost accuracy. For quotation on price and delivery Write Dept. G 2
HARTFORD Special
THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD 5, CONN.

A Reputation for GOOD BUSINESS
FOR over forty years, Earle Gear and Machine Company has manufactured gears of every size and type, together with special machinery. We have always operated with the idea that it's good business to guarantee our customers exactly the kind of work they want.
It's good business for you, too. You are assured that every Earle gear, large or small, is expertly made to meet your most exacting requirements—accurately cut to close tolerances for smooth, quiet operation and long trouble-free life with better power transmission.
We give our customers the kind of work they want, and it's on that basis that we ask you to write for estimates on your work.
The EARLE GEAR & MACHINE CO., 4723 Stenton Ave., Phila. 44, Pa.
EARLE GEARS
SPUR, BEVEL, WORM, SPIRAL, HERRINGBONE AND RACKS, ETC.

No. 2 in a series of performance case histories.

. . . says Plant Engineer at large thermo-plastic adhesives manufacturing plant

Actual photo of installation referred to in text. This Grant Reducer has not been removed or serviced (except for lubrication) since it was installed in 1933.

"We are using a Grant Reducer on a foil rewind machine to reduce motor speed from 1200 r.p.m. to 60 r.p.m. This reducer has been operating about 40 hours a week for 15 years and has required no maintenance except occasional lubrication, yet it's still running like new."

There's performance!

Yet it's just *one* of many reports coming from plants where Grant Speed Reducers are used. Is it any wonder Grant Reducers are famous for economical service?

Why not cut costs in your plant by specifying Grant Speed Reducers for extra features which add up to long, trouble-free service?

Grant Gear Works, Inc.
169 West Second Street
South Boston 27, Mass.

WRITE TODAY FOR FREE CATALOGUE
1877 – GEARED TO INDUSTRY'S NEEDS FOR 71 YEARS – 1948
Grant
SPEED REDUCERS
7 gear arrangements — hundreds of ratios

IF YOU DESIGN,
MAKE or HEAT TREAT
TOOLS or DIES...

New! Completely Revised

GIVES YOU PRACTICAL
ANSWERS TO QUESTIONS SUCH AS...

"Which steel should I select for the job?" "How can I boost production per grind?" "How does design affect safety in heat treating?" "How can I avoid grinding checks?" "How long should a die be heated before quenching?" "What is the best furnace atmosphere for each steel?" . . . and hundreds more!

TOOL STEEL SIMPLIFIED

By Frank R. Palmer, *President* — George V. Luerssen, *Chief Metallurgist*
The Carpenter Steel Company
564 Pages 355 Illustrations
$2.00 Postpaid in U. S. A. $2.50 Elsewhere

564 pages of plain, practical information on how to get better tools and dies, lower costs, and more production from present equipment! 355 charts, diagrams, and photographs that clearly illustrate all important phases of tool and die making and heat treating! "Tool Steel Simplified", its 21 chapters completely revised, gives you practical answers that make your job easier and more valuable. Thousands of apprentices and skilled men responsible for the design, making or heat treating of tools and dies have profited by the first edition. The new, enlarged "Tool Steel Simplified" will be even more helpful to you! Yours *at cost*—order today as many copies as you need.

OVER 80,000 COPIES OF FIRST EDITION IN USE!

CLIP AND MAIL NOW!

THE CARPENTER STEEL CO • READING, PA. • DEPT. 1A-2

Please send me, postpaid, your revised "Tool Steel Simplified". I enclose $2.00 ($2.50 outside U. S. A.) in full payment of the book.

Name _____ Title _____
Firm Name _____
Mailing Address _____
City _____ State _____
PLEASE PRINT

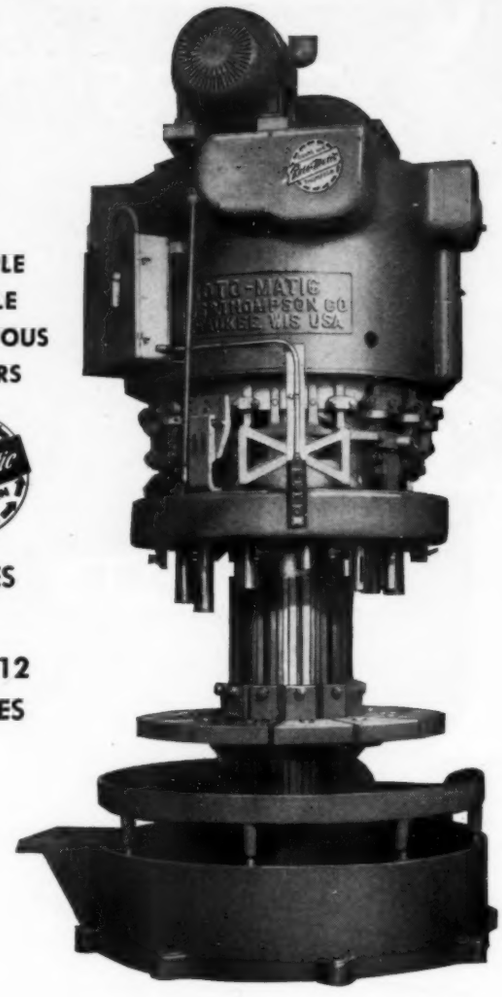
ROTO-MATICS

VERTICAL
MULTIPLE
SPINDLE
CONTINUOUS
DRILLERS

DAVIS and THOMPSON Roto-Matic

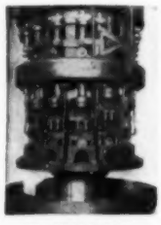
3 SIZES

6-8 OR 12
SPINDLES

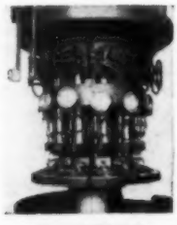


One Vertical ROTO-MATIC will equal the production of a whole battery of single spindle drillers with a proportionate reduction in labor and maintenance costs.

Where production demands fall below the capacity of the machine, on a single part, interchangeable fixtures can be designed for a variety of jobs. Where two operations are required on a single piece, requiring the same feeds and speeds, spindles can be arranged to give you the proper ratio of production.



2 SPINDLE DRILL HEADS



BALANCING OPERATION

AUTOMATIC CLAMPING

Engineering skill and thirty years of development have given us the necessary background to tool up these machines for the maximum in efficiency and accuracy of work, whether it be drilling, milling, boring, reaming, spot facing or chamfering.

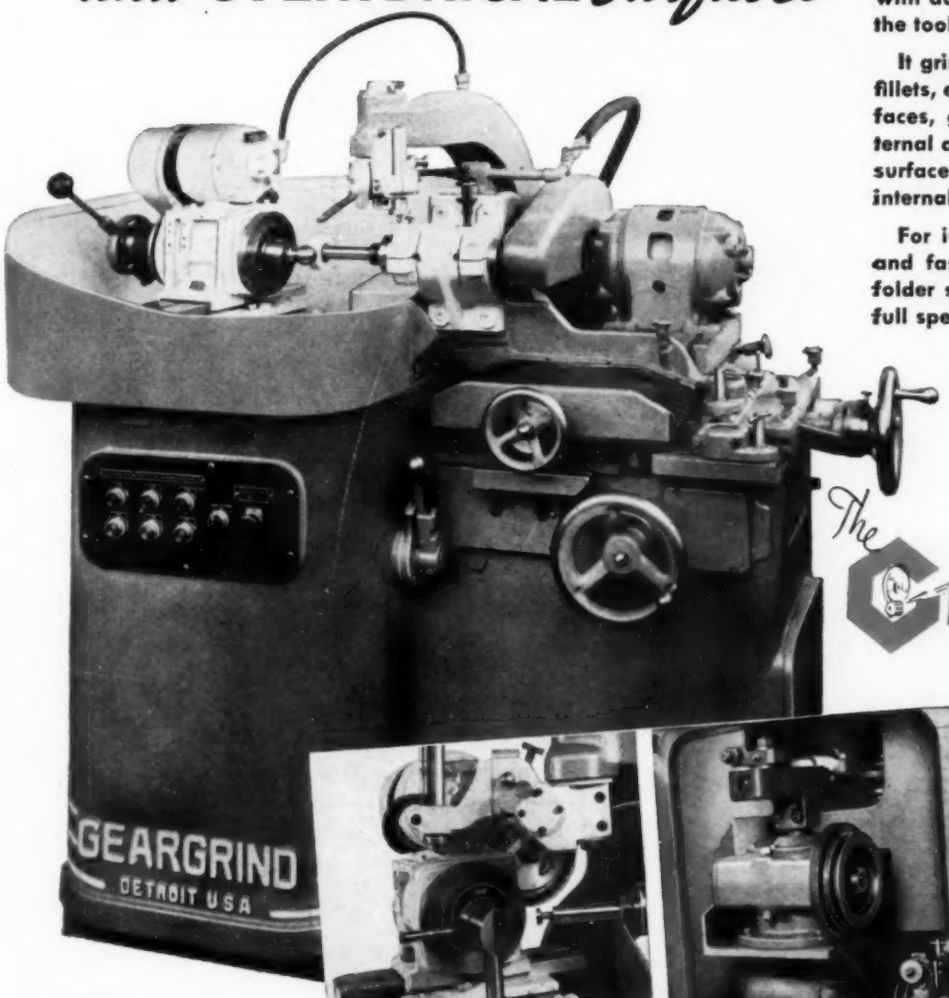
WRITE FOR BULLETIN 101.

DAVIS and THOMPSON CO.
MANUFACTURERS OF *Machine Tools*
MILWAUKEE 14, WISCONSIN

Save Man Hours!...

with the New GEARGRIND *Universal Oscillating* PRECISION GRINDER

for Finishing
SPHERICAL, CONICAL
and* CYLINDRICAL *Surfaces

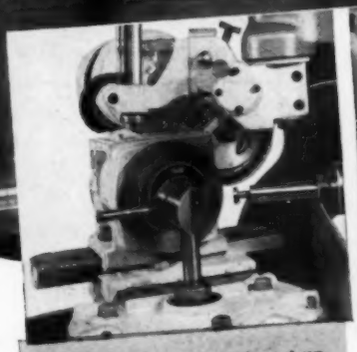


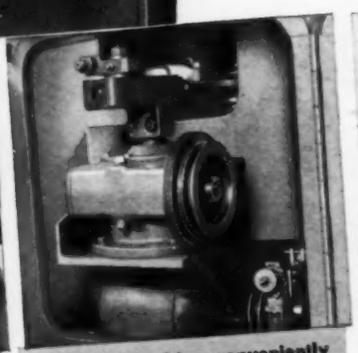
● Fine finish, extreme accuracy, plus lower costs! That's what you get from this precision grinder, both on the production line, with automatic feed and indexing, and in the tool room or experimental shop.

It grinds annular ball bearing races and fillets, external and internal cylindrical surfaces, generated or formed spherical external and internal surfaces, barrel shaped surfaces, external conical surfaces, and internal tapers.

For information that will lead to better and faster work, write for our illustrated folder showing many set-ups, and giving full specifications.

The GEAR GRINDING MACHINE COMPANY
DETROIT 11, MICH., U.S.A.


Micrometer precision in set-up


Oscillating drive, conveniently controlled

Dial indicators insure accurate feed of the grinding wheel

Write for Literature

AMAZING ADAPTABILITY

For Production or Maintenance

UNITED STATES No. 1
FULL ANTI-FRICTION BEARING
HAND MILLING MACHINE

Ask your distributor for full details or write direct.

UNITED STATES MACHINE TOOL CO.

14 E. 72nd St., CINCINNATI 16, Ohio

BUY ★ U.S. ★ SECURITY BONDS NOW!

AN EXCEPTIONAL OPPORTUNITY

For A Man Capable of Filling This Position of

GENERAL SALES MANAGER

The company with which this man will become associated has been manufacturing universally used cutting tools for almost 30 years. Today, it is one of the best known concerns in its industry . . . and is still growing.

The man we are looking for is more than a good salesman. He must have executive sales ability . . . be able to supervise the activities of twelve regional or district sales managers . . . and direct the company's sales efforts through approximately 200 distributors. The majority of these distributors are mill supply houses selling to the metal-working industries, which necessitates a thorough familiarity with sales organizations of this type and a personal acquaintanceship with top men in the mill supply business.

While an engineering or production background is not an essential requirement, this man should have sufficient mechanical training and experience so that he can quickly grasp the proper applications for the company's products. In directing the sales program, his duties will include establishing sales quotas, planning expansion of sales, supervising the advertising program, and making regular trips to call on principal distributors and to work with the company's regional sales managers.

To the man who can offer the experience and ability that this job calls for, we can promise not only an interesting starting salary but an opportunity which may lead to a position of even more importance in the company in the future. In replying, give your age, outline your history of education and employment in full detail, state salary desired, and enclose recent photograph or snapshot of yourself.

Our organization has been informed of this advertisement.

S.W.-6714, AMERICAN MACHINIST
520 N. MICHIGAN AVE., CHICAGO 11, ILL.

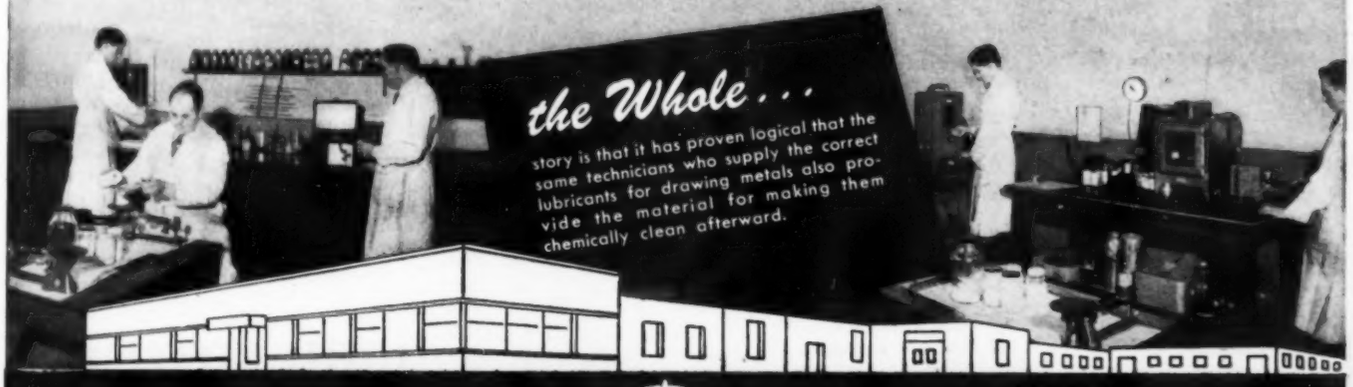
Half of this message has to do with NORTHWEST products and processes for chemically cleaning ferrous and non-ferrous metals preparatory to plating, vitreous enameling, painting, etc., each problem involving a specific programing of one or more of the thirty-five standard NORTHWEST Cleaning Compounds including Electrolytic, Immersion, Solvent, Spray, and Water Wash types . . . the "Lo-HI" pH process of chemically cleaning metals, preparatory to plating, porcelain enameling, etc., makes practical a control that management can plan on in these departments regardless of the type of metal or soil.

HALF pH control

the other

HALF SUPER-DRAW

is concerned with metal forming lubricants developed for ferrous and non-ferrous metals in both pigmented and non-pigmented form . . . SUPER-DRAW products are specifically compounded for: 1. Brass and Brass Alloys, 2. Cold Rolled Steel, Enameling Iron, Stainless Steel and Aluminum, 3. Alloys of Steel, Aluminum and Copper . . . SUPERDRAW compounds will handle light, medium, and heavy operations . . . may be applied by brush, roller, spray, or dipping . . . A request on your letterhead will bring a technician to consult you on your drawing and cleaning problems . . .



the Whole . . .

story is that it has proven logical that the same technicians who supply the correct lubricants for drawing metals also provide the material for making them chemically clean afterward.

LO HI pH

NORTHWEST CHEMICAL CO.

9310 ROSELAWN DETROIT 4, MICH.

pioneers in pH cleaning control — serving you since '32

Note your specific interest on the coupon below and attach to your letterhead. It will bring complete information.

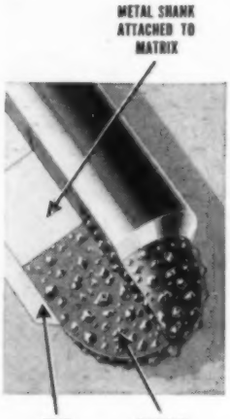
pH Cleaning control		SUPER-DRAW Metal Forming Lubes for	
Electrolytic	☐	Cold Rolled	☐
Immersion	☐	Enameling Iron	☐
Solvent	☐	Stainless Steel	☐
Spray	☐	Special Alloys of	
Water Wash (Paint Booth)	☐	Steel ☐ Brass ☐ Aluminum ☐	
Ferrous ☐ Non-Ferr. ☐		Pgtd. ☐ Non-Pgtd. ☐	

LOST ANY DIAMONDS LATELY?

—then it's a cinch you'd better change to the dresser with the

"EDUCATED DIAMONDS"

(They stand abuse . . . and *can't* come loose!)



Imbedded in a matrix of super-hard Carboloy Cemented Carbide, these keen-cutting diamond points stand *real abuse* . . . they can't come loose! They hold on "for dear life" throughout their entire period of usefulness.

You not only save on diamond replacement and remounting, but you can operate at faster traverse speeds.

Savings in diamonds, savings in time! Worth investigating? Sure it is. Send in the coupon asking for free booklet. There's no obligation . . . and you stand a chance to save up to 40% on dressing costs!

FREE BOOKLET

DIAMOND DRESSERS

by CARBOLOY ®

CARBOLOY COMPANY, INC., 11149 E. 8 Mile Avenue
Detroit 32, Michigan

Gentlemen:

Please send me free booklet No. DR-480, describing how these Carboloy dressers can save up to 40% on my dressing costs.

*Name*_____

*Title*_____ *Company*_____

*Street*_____

*City*_____ *Zone*_____ *State*_____

IT TAKES SOMETHING EXTRA TO BE A *Specialist!*

The railroad engineer is a specialist, trained by years of apprenticeship to accept one outstanding qualification—that of personal responsibility. The Bath organization recognizes its responsibility to industry by maintaining the highest standards of quality throughout the step-by-step production of ground thread taps.

The selection of steel, the grinding of threads from the solid AFTER hardening, the accurate adherance to specifications and a rigid system of inspection, guarantee the uniform quality of Bath stock and special size ground thread taps. Years of apprenticeship have produced experienced Bath craftsmen, ready to help with your tap problems. We invite your inquiry—see your Bath representative or write us direct.

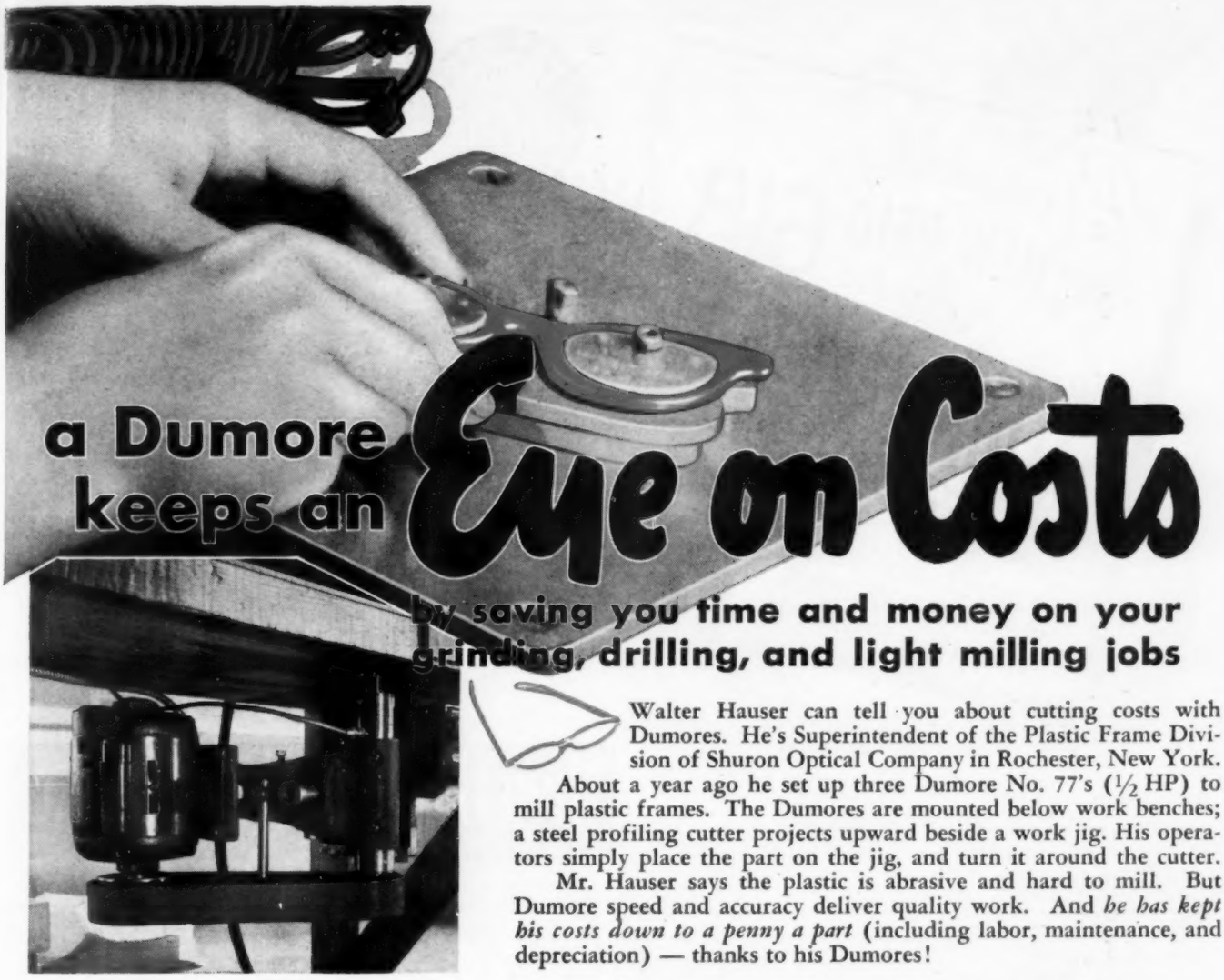
(Transportation is paid to your plant on all Bath products)

JOHN BATH CO. INCORPORATED

22 Grafton St., Worcester, Mass.

GROUND THREAD TAPS
PLUG THREAD GAGES
INTERNAL MICROMETERS
RING THREAD GAGES

GROUND FROM THE SOLID — BATH — JOHN BATH CO.



a Dumore keeps an Eye on Costs

by saving you time and money on your grinding, drilling, and light milling jobs

Walter Hauser can tell you about cutting costs with Dumores. He's Superintendent of the Plastic Frame Division of Shuron Optical Company in Rochester, New York.

About a year ago he set up three Dumore No. 77's (½ HP) to mill plastic frames. The Dumores are mounted below work benches; a steel profiling cutter projects upward beside a work jig. His operators simply place the part on the jig, and turn it around the cutter.

Mr. Hauser says the plastic is abrasive and hard to mill. But Dumore speed and accuracy deliver quality work. And *he has kept his costs down to a penny a part* (including labor, maintenance, and depreciation) — thanks to his Dumores!

You, too, can cut your costs with Dumores!

You know about Dumore's dependable precision for toolroom grinding. But that's only half the story. You can do so many different toolroom, maintenance, and production jobs with a Dumore that it is now a "universal" shop tool.

You can use a Dumore for all kinds of grinding—external, internal, surface, tool, and thread. You can set up a Dumore for drilling and light milling, too. A Dumore converts your standard machine tools into precision grinders. A Dumore is a top-notch work-head for special setups you can build at low cost. Quite often, a Dumore can help you avoid buying a high-priced special machine-tool.

Plan to do *more* with Dumores! See your Dumore distributor today. Ask him to tell you the complete Dumore story. There are 7 models, with interchangeable quills for work to 24" depths, at speeds up to 42,500 rpm, with ± .0001" precision. And don't forget Dumore Handgrinders and other tools. They help you cut your costs too!

Tear out this coupon and mail today!

THE DUMORE COMPANY, Dept. K-14, Racine, Wisconsin G-15

Yes, I'm interested in cutting costs and doing a better job!

Send me information on the items I have checked:

- ☐ Toolpost Grinders
- ☐ Handgrinders
- ☐ Flexible Shaft Tools
- ☐ High-Speed drilling equipment

Name .....

Company ..... Position .....

Address .....

City ..... (. . .) State .....

DUMORE

Reg. U. S. Pat. Off.

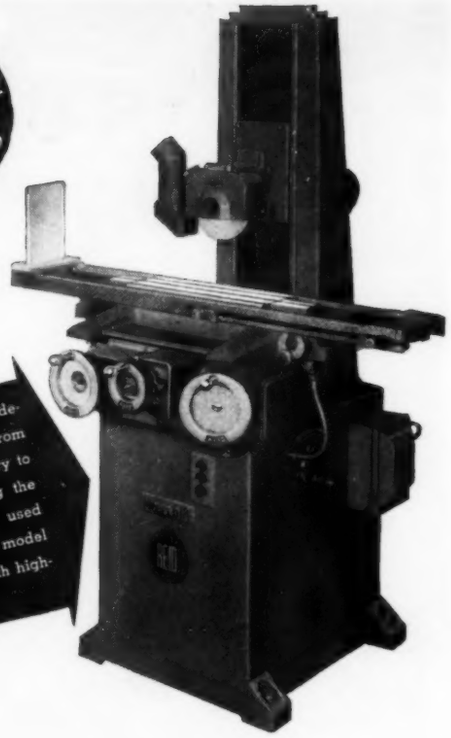
RACINE, WISCONSIN

Sold by leading industrial distributors

Presenting
THE NEW REID *Model* 618
WITH VARIABLE TABLE SPEED
5 to 35 FEET PER MINUTE
ADJUSTABLE FOR GRINDING VARIOUS METALS AND MATERIALS

PRECISION REID SURFACE GRINDERS

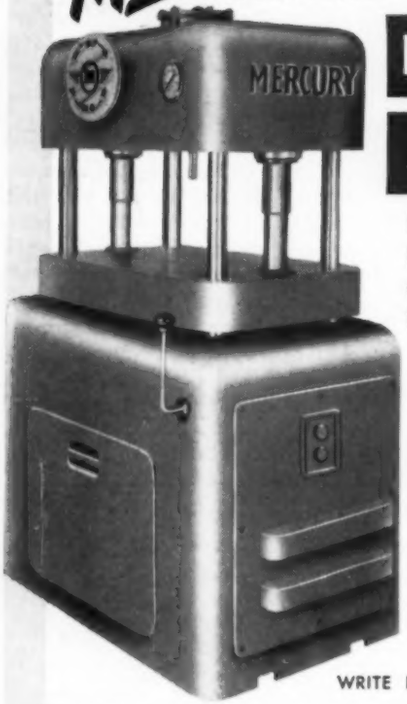
This moderately priced model has been developed in answer to the many requests from manufacturers who have found it necessary to have variable table speeds in handling the varied type of materials that are being used more and more in modern industry. The model 618 operates quietly and smoothly, with high-precision efficiency.



CATALOG AND PRICES ON REQUEST
When You Buy REID
You Buy PRECISION
DEALERS IN ALL SECTIONS

REID BROTHERS COMPANY, INC.
BEVERLY MASSACHUSETTS

Mercury SERIES H-25
GENERAL PURPOSE
COMPLETELY SELF CONTAINED



HYDRAULIC PRESS

Hydraulic equipment including Motor and starter, housed within base of machine.

•

Available in 25 or 50 ton capacity.

•

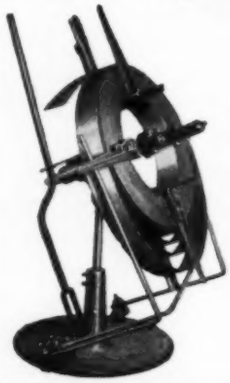
SIZE 22" F. TO B., 26" R. TO L.

SYMBOL OF FINE CRAFTSMANSHIP

WRITE FOR INFORMATION

Mercury Engineering Corporation
2100 N. FARWELL AVENUE • MILWAUKEE 2, WISCONSIN

If you operate a press room find out about *Littell* REELS



Speed up your blanking and cupping. Littell Reels use time-saving, money-saving coil stock. No lost motion for continuous insertion of sheet stock. Less scrap. Automatic work possible.

Littell Reels are self-centering for smooth feeding. They never overrun. Adjustable heads. Quick loading. Send for full details on the Littell line.

F. J. LITTELL MACHINE CO.
4169 Ravenswood Avenue
CHICAGO 13, ILLINOIS

Empire **LIVE CENTERS** *ARE*
• ACCURATE • VERSATILE
• HEAVY DUTY

PAT. PEND.

In stock, ready for immediate delivery: 1 to 6 Morse-Taper, 2 to 5 Morse-Handy, 6 to 13 Jarno, 5 to 12 Browne & Sharpe; ½" to 2" in straight shanks. Special shanks and points made to order. *Ask your supplier or write for literature.*

Points illustrated are standard.

ROYAL PRODUCTS
71 SPRING ST.
NEW YORK, N. Y.

WE'RE READY WITH A *COMPLETE* SERVICE

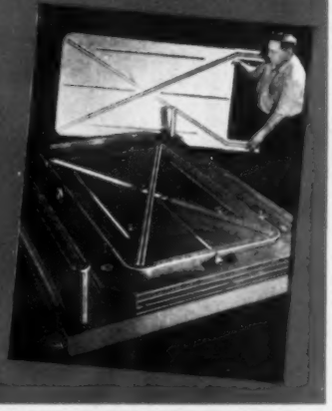
Here it is, all under one roof, a unique industrial service which 1) cuts costs, 2) speeds delivery, and 3) provides one centralized control.

This Acme service is a combination of four important activities: Tools and dies . . . patterns . . . non-ferrous castings . . . and special machinery development. In many cases this permits Acme to do the entire job, from blueprint to finished product.

A new brochure describing Acme Aluminum Alloys, its activities, and its products is now ready for distribution. Send for your copy today.

TOOLS

Dies, fixtures, gauges, and other precision tools for automotive, refrigeration, aircraft, and other fields are produced in Acme's completely equipped tool room. *Right: Drawing die for refrigerator back panel.*

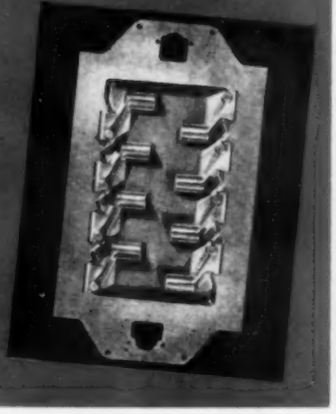


CASTINGS

Acme has tremendous capacity for the pouring of aluminum, brass, and bronze castings. All recognized alloys . . . sand and permanent mold. *At right: Aluminum valve piston weighing 2490 pounds after rough finishing.*

PATTERNS

Acme builds cope and drag plates, core boxes, match plates, pattern inserts, and wood and metal patterns. Specialists for 18 years. *Right: Aluminum match plate; multiple sections from one master pattern.*



ENGINEERING

Single purpose, special machinery is a specialty of the Acme engineering department. *At right: An Acme designed and Acme built automatic oil and refrigerant charging board.*

TRIPLE A

Reg. U. S. Pat. Off.

Acme ALUMINUM ALLOYS, INC.

232 N. FINDLAY STREET • DAYTON, OHIO

From A to Z...

Fred Colvin's latest book covers—

by Fred Colvin

Editor Emeritus, *American Machinist*

208 pages, 5¾ x 7½ 110 photographs and tables, $2.50

Here is a book written especially for the enterprising mechanic who wants to start a profitable machine shop business for himself. Drawing on the experience gained through 60 years of direct, personal contact with shops and shop work of many kinds and sizes, the author points up the various problems you face as a business novice—provides you with page after page of valuable, common-sense advice for mastering these problems. The book is filled with illustrative examples that show you the mistakes others have made—and how to avoid making the same mistakes yourself.

Shows you how to run a shop more skilfully, profitably

This practical manual puts you in command of all the important management pointers that make for more efficient and profitable operation. It discusses such important factors as: how to choose a suitable location, how to select machines and other equipment, whether to buy new, or second-hand, machines, where and how to store materials, how to make charges for different kinds of work. It covers both managing the work and supervising your employees, and points out ways to adapt your shop to handle specialized jobs with limited equipment.

This table of contents shows you the complete coverage:

1. Starting a Small Shop
2. Selecting Machines and Tools
3. Small Shop Layout
4. Shop Furniture
5. Drills and Drilling
6. Filing and Sawing
7. Engine Lathe Work
8. Milling Machine Work
9. Cutting Speeds
10. Water-Hardening Tool Steel
11. Specialization
12. Overhead

Covers different machining methods —includes time-saving tables

In the well-known Colvin style—clear, practical, completely dependable—the book details the various methods to use in performing specific jobs. It illustrates the kinds of machines and tools you can use, and shows you how to handle a wide variety of work on different machine tools. The book also includes a number of convenient, ready-reference tables that give you important data on: cutting speeds, cutting-fluid selection, correct teeth and speeds for hand-operated hacksaws, for power-operated hacksaws, for skip-tooth band-saws, etc.

SEE THIS BOOK FOR TEN DAYS FREE

McGRAW-HILL BOOK CO., 330 W. 42 ST., NYC 18

Send me Colvin's STARTING A SMALL MACHINE SHOP for 10 days' examination on approval. In 10 days I will send $2.50 plus few cents postage, or return the book postpaid.*

Name .....

Address .....

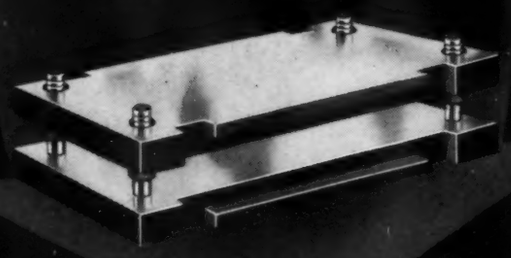
City and State .....

Company .....

Position A-10-21-48

*SAVE: We pay mailing costs if you send cash with order. Same return privilege.

Finely Made Special Die Sets



Our production facilities are employed *exclusively* in the design and fabrication of standard and special steel and semi-steel die sets. "DETROIT" specialization guarantees dependable, prompt service and workmanship of the highest quality on both standard and special jobs. "DETROIT" die sets are Micrometric machined to assure long die life and consistently satisfactory operation.

CALL "DETROIT"

DETROIT	TR 2-5150
BUFFALO	PA 9206
DAYTON	HE 3042
INDIANAPOLIS	HU 5604
LOS ANGELES	AD 7251
MILWAUKEE	ED 2359
MINNEAPOLIS	AT 5264
PHILADELPHIA	VI 4-4084
PITTSBURGH	GR 1362
PORTLAND, ORE.	AT 3697
ROCK ISLAND, ILL.	RI 743
ST. LOUIS	FR 6811
SAN FRANCISCO	EX 2-7018
SEATTLE	LA 7100
TOLEDO	GA 5706

DETROIT DIE SET CORPORATION

2895 W. GRAND BLVD. • DETROIT 2, MICHIGAN

DETROIT DIE SETS ★

"THE WHEELS OF INDUSTRY"

Easymount

It's New . . .
It's Fast . . It's Economical!

Sterling's Easymounts and Grinding Wheels offer a positive solution of the many grinding problems related to efficient sharpening of tungsten carbide tools and the rapid finishing of tools of various steels.

Sterling's Easymounts and Grinding Wheels are available in sizes to fit various types of grinders: Willeys, Sellers, Heald, Excello, Baldor, Hammond, Oliver, Delta, Prosser, Criterion, Sundstrand, Blount, and Bur-a-way.

The rigidity of the one-piece steel Easymount plus the unique method of mounting the wheel in the assembly provide much longer than usual wheel life. The spring assembly permits all-'round tension as the retaining screws are tightened and keeps them from touching the abrasive—an important safety feature.

Sterling's Easymounts can be readily applied to your setup. Write today—our engineers will gladly cooperate.

A complete analysis is contained in this new folder, available upon request.

• STERLING ABRASIVES •

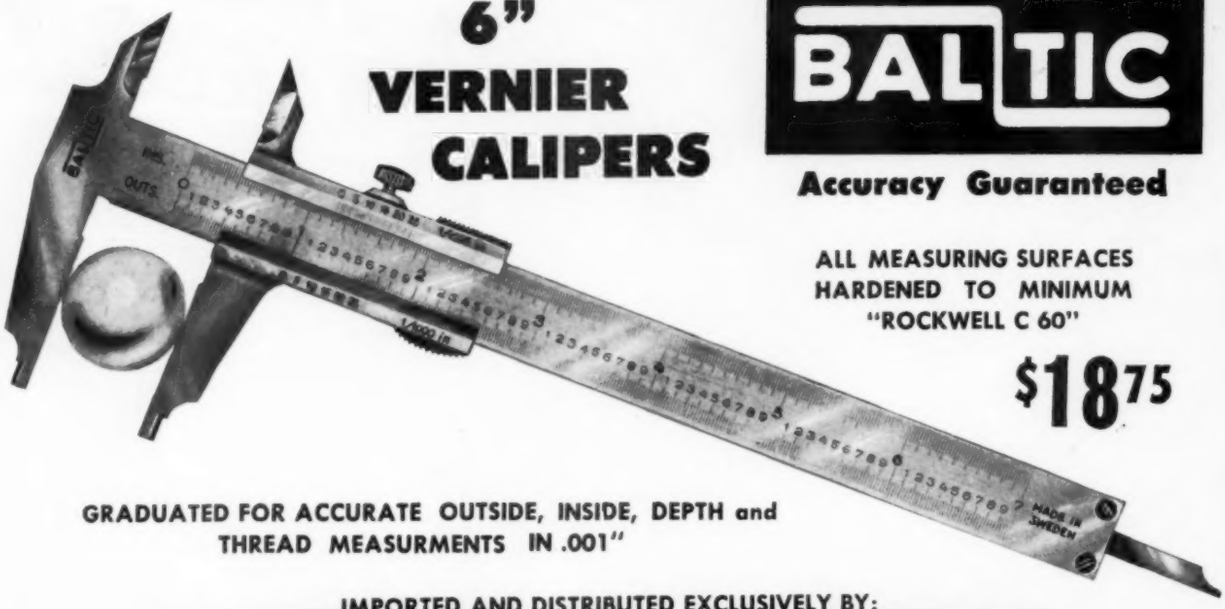
THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

6" VERNIER CALIPERS

BALTIC

Accuracy Guaranteed



ALL MEASURING SURFACES HARDENED TO MINIMUM "ROCKWELL C 60"

$18.75

GRADUATED FOR ACCURATE OUTSIDE, INSIDE, DEPTH and THREAD MEASURMENTS IN .001"

IMPORTED AND DISTRIBUTED EXCLUSIVELY BY:

DEALERS INQUIRIES INVITED

TRANSOCEAN TRADING COMPANY

IMPORT - MANUFACTURER'S REPRESENTATIVES - EXPORT

532 No. LA BREA
LOS ANGELES CALIF.

18 PEARL STREET
NEW YORK 4, N. Y.

THE SOLUTION TO YOUR MILLING PROBLEMS

SEND FOR THIS FREE FOLDER

LEARN HOW...

to increase your production

to reduce your milling costs

BEMIS & CALL COMPANY

Springfield • Mass.

MAIL COUPON TODAY

BEMIS & CALL COMPANY
140 Main Street, Springfield, Mass.

Send me free folder giving detailed information about the Milmaster "that converts one machine into a tool shop."

COMPANY_____

YOUR NAME_____

ADDRESS_____

CITY_____ STATE_____

ALMOND DRILL CHUCKS

Maximum Gripping Power with Extreme Accuracy and Long Life

Write for Catalog

T. R. ALMOND MFG. CO.

Ashburnham, Mass., U.S.A.

PROMPT DELIVERIES

on

Herringbone Gears

(up to 60" dia.)

Cut on new Sykes Generators

You get accuracy . . . long life . . . and prompt deliveries on herringbone and other types of commercial gears.

Send your prints today to

AUTO ENGINE WORKS

341A N. Hamline Ave., St. Paul, Minn.

MEMBER OF AGMA

Wherever Tools are held
Why is the Jacobs Plain Bearing Chuck standard equipment with 98% of all portable tool builders in the world today? It's because no other chuck offers such a powerful, accurate, durable grip at so low a price. The Jacobs Manufacturing Company, Hartford 2, Connecticut.
Jacobs Chucks
No 3 KEY TYPE JACOBS CHUCK
FOREMOST IN CHUCKS
FIRMEST IN GRIP

IF IT'S A JACOBS ...IT HOLDS

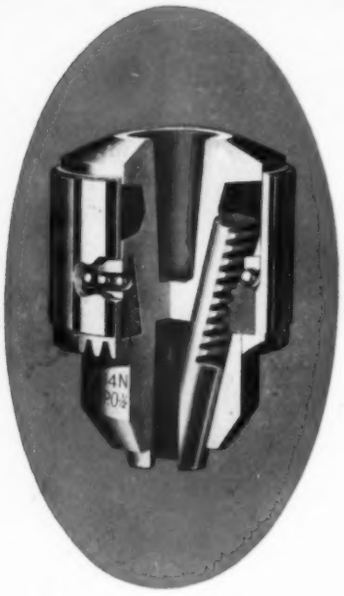
HOW TO GET THE FACTS

For full details about sizes and prices of Jacobs Super Chucks, Plain Bearing Chucks and Rubber-Flex Tap Chucks, ask your INDUSTRIAL SUPPLY DISTRIBUTOR for Bulletins 48-M, 48-N and 48-T, respectively. The Jacobs Manufacturing Company, Hartford 2, Connecticut.

STOCKED BY YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

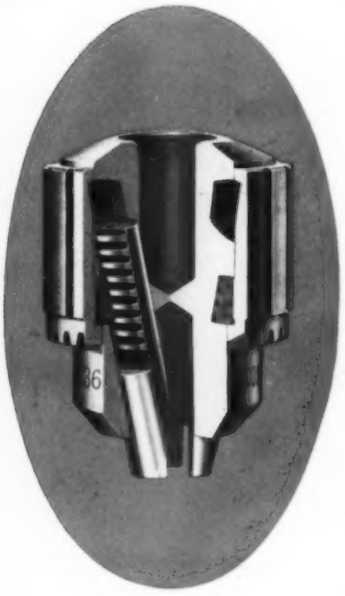
Jacobs Chucks

FOREMOST IN CHUCKS · FIRMEST IN GRIP



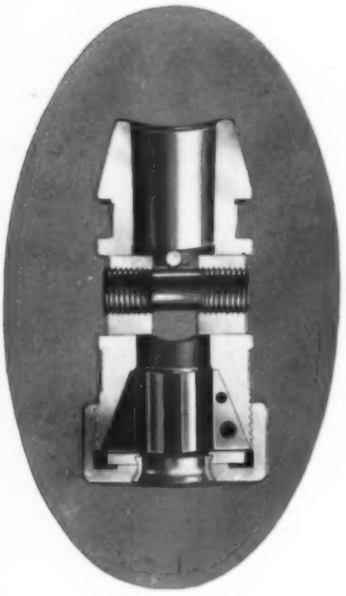
THE BALL BEARING SUPER CHUCK providing gripping power, accuracy and durability offered by no other chuck in the world today

The recently improved inserted ball thrust race and continuous deep groove, chrome nickel alloy jaws and heat-treated alloy steel nut have made this chuck the world-wide favorite for heavy-duty drilling. It is offered in six capacities from 0–¼″ to ⅜–1″ and is highly recommended if you desire the most from your drill press, lathe, or hand screw machine.



THE PLAIN BEARING CHUCK that's standard equipment with 98% of the portable tool builders here and abroad

These light- and medium-duty, threaded and tapered back models are made to the same close tolerances as the Ball Bearing Super Chuck. Precision-ground construction of all moving parts results in a tightening action which maintains jaw parallelism for dead-center tooling. This chuck is made in ten capacities from 0-5⁄32″ to 3⁄16-¾″ and is particularly designed for portable drills, light- and medium-duty drill presses and lathes.



THE RUBBER-FLEX TAP CHUCK with the parallel bite that holds true and tight

All sizes of taps get a non-slip, positive drive from the floating back jaws and the parallel bite of the unique Jacobs Rubber-Flex Collet. Light weight, small diameter, firm grip and simplified tap changing are combined in these accurately ground chucks. That's why they're ideal for any tapping head, tapping machine, drill press or screw machine. Three chucks handle the entire range of tap sizes from #0 to ⅝″.

These Nuts are oversize

These Nuts are undersize

These Nuts are the right size

Circle Ⓑ Bolts and Nuts . . . both standard and special . . . are under constant development by a fully-equipped research staff. New developments in metallurgy and manufacture result in ever-better products for Buffalo Bolt customers.

BUFFALO BOLT COMPANY

North Tonawanda, N. Y.

SALES OFFICES IN PRINCIPAL CITIES

Export Sales Office: Buffalo International Corp., 50 Church Street, New York City

...they are CIRCLE Ⓑ NUTS

KORFUND Vibration Control Helps you 4 Ways

1. **Steps Up Production**—Often permits increased machine speeds—makes economical work-flow grouping of machines practical regardless of impact or vibration characteristics.

2. **Cuts Scrap Rate**—Isolation of impact and reciprocating machinery reduces work spoilage, prevents "chattering" and "bouncing" on work in process. Also protects precision tools against external vibration.

3. **Boosts Employee Efficiency**—Through relief from fatigue caused by vibration.

4. **Reduces Maintenance Costs**—Machines last longer; buildings last longer.

Korfund Vibro-Isolators are efficient, easy to install and adjust, and long-lived. They are sold on a "satisfaction guaranteed" basis.

Because Korfund utilizes all three isolation media—steel springs, cork, and rubber—recommendations are impartial—you get the medium or combination best suited for the job. And Korfund recommendations, whether for standard Vibro-Isolator Units or a specially-engineered installation, are backed by 45 years of experience.

"Vibration in Industry," a 12-page illustrated booklet now available, makes good profitable reading. We'll be glad to send you a copy.

The
KORFUND COMPANY, INC.
48-60 Thirty-Second Place
Long Island City 1, N. Y.
Vibration Control Specialists for Over 45 Years

Only AIR EXPRESS gives you all these advantages

[A combination you don't get with other air-shipping methods]

1. Special pick-up and delivery *at no extra cost.* Your shipments are picked up promptly when you call; fast delivery to consignee's door.

2. *You get a receipt for every shipment,* and delivery is proved by signature of consignee. One-carrier responsibility. Complete security.

3. Assured protection, too—valuation coverage up to $50 without extra charge; 10 cents for each additional $100 or fraction thereof.

These advantages, plus 21 others, make Air Express the best and fastest way to ship. Your shipments go on every flight of the Scheduled Airlines—repair parts, equipment, finished items *keep moving* to where they're needed. Reach any U. S. point in hours. Phone local Air Express Division, Railway Express Agency, for fast shipping action. Specify "Air Express" on orders for quickest delivery.

FACTS on low Air Express rates

22 lbs. machine parts goes 700 miles for $4.73.
10 lbs. printed matter goes 1000 miles for $3.31.
30-lb. carton of new fashions goes 500 miles for $4.61.
Same day delivery in all these cases if you *ship early.*

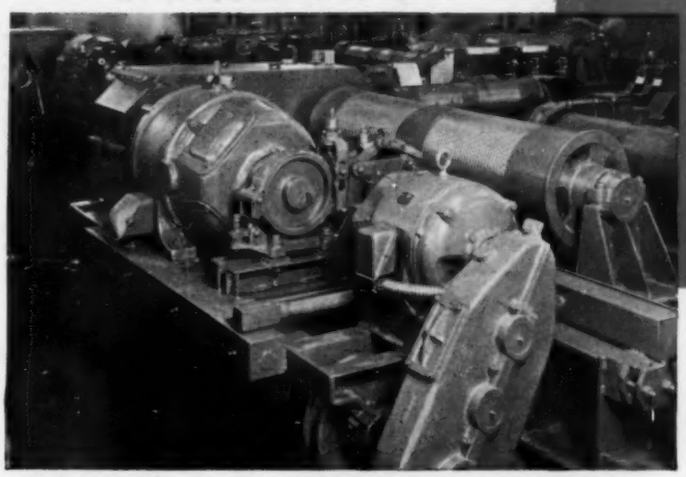
SPECIFY AIR EXPRESS
GETS THERE FIRST

Rates include pick-up and delivery door to door in all principal towns and cities

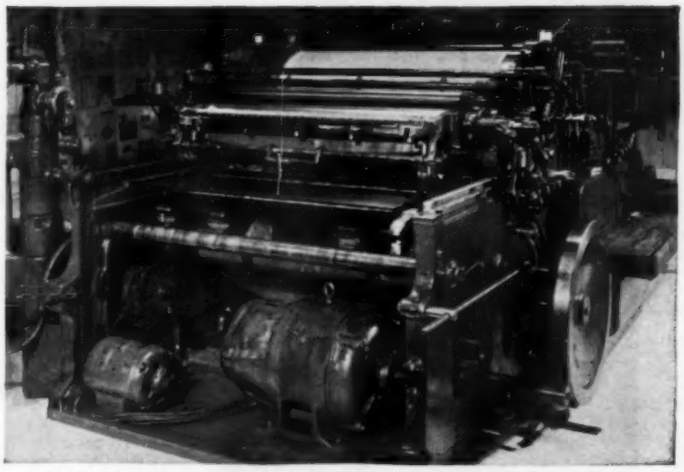
AIR EXPRESS, A SERVICE OF RAILWAY EXPRESS AGENCY AND THE
SCHEDULED AIRLINES OF THE U. S.

Century SLIP RING MOTORS

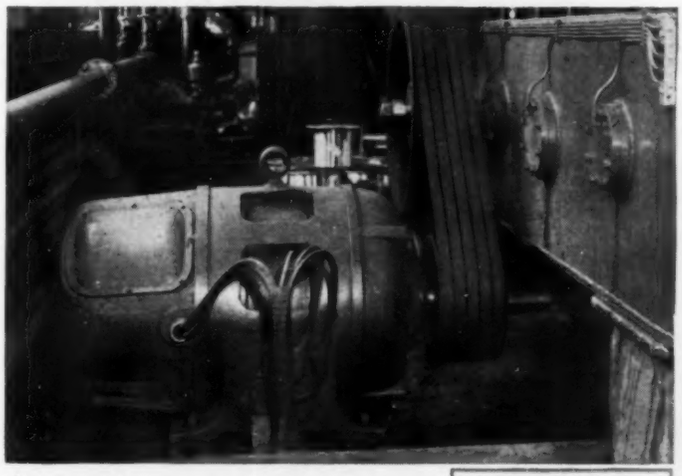
Supply High Torque AND Smooth Acceleration for Applications Requiring...



● 40 horsepower Century Slip Ring motor drives crane hoist and 5 horsepower Slip Ring motor drives crane travel.



● 10 horsepower Century Slip Ring motor supplies flexible power for a printing press.



● 75 horsepower Century Slip Ring motor driving wire plant machine.

Century C MOTORS

Adjustable Varying Speeds
Torque Control
Low Starting Current

Century Slip Ring motors provide flexibility of torque and speed to match varying load requirements of the machines they drive.

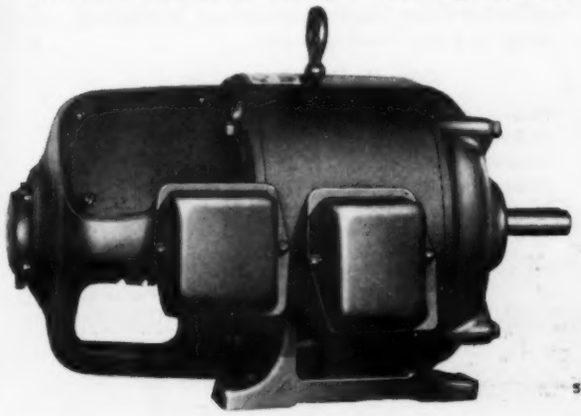
Typical applications for these motors are: cranes, hoists, bending rolls, printing presses, wire mills, bridges, mitergates, locks, dams, conveyors, elevators, reciprocating pumps, and other high impact and inertia loads.

If you have machines that require variable speeds or torques — as well as low starting current — specify Century Slip Ring motors.

Century builds a complete line of electric motors, in sizes from 1/6 to 400 horsepower for all popular electric power applications.

Specify Century motors for all your electric power requirements.

CENTURY ELECTRIC CO.
1806 Pine St., St. Louis 3, Missouri
Offices and Stock Points in Principal Cities



590

IT'S A Mac-it

PRONOUNCED "MACK-IT"

Mac-it ⅜" x 2½" Hollow Set Screws have grip of more than 17,000 pounds.

BETTER, FASTER SERVICE WITH THIS *COMPLETE* MAC-IT LINE!

Because many standard types of Mac-its are stocked throughout the country for quick delivery, and because specials can be engineered to your own specifications, you'll find it pays to investigate Mac-its *first.*

Mac-it's 35 years' experience in the manufacture of heat-treated, alloy steel screws is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada. Write for new catalog today!

Other Mac-it products include:

Hollow Lock Screws	Socket Screw Keys
Socket Head Cap Screws	Square Head Set Screws
Stripper Bolts	Hexagon Head Cap Screws
Hollow Pipe Plugs	. . . and many others

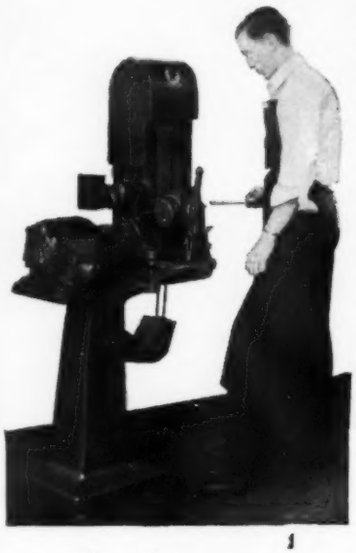
Marketed Nationally Since 1913 by

STRONG, CARLISLE & HAMMOND COMPANY

Cleveland 13, Ohio

Manufactured by MAC-IT PARTS COMPANY, Lancaster, Pa.

Put Your CYLINDRICAL POLISHING or Straight Line Finishing on the "PRODUCTION" TYPE S CENTERLESS MACHINE



This modern Surfacer, Polisher and Buffer is a centerless machine which can be operated in either a horizontal or vertical position. It can be handled by anyone in the shop and for any material that can be ground or polished. Flat or irregular work can also be finished by merely removing Flat Surfacing Platen, and manipulating by hand.

Special features include: ball bearings throughout, quick belt change, adjustable gauge for bevels, and automatic belt take-up.

Specifications:

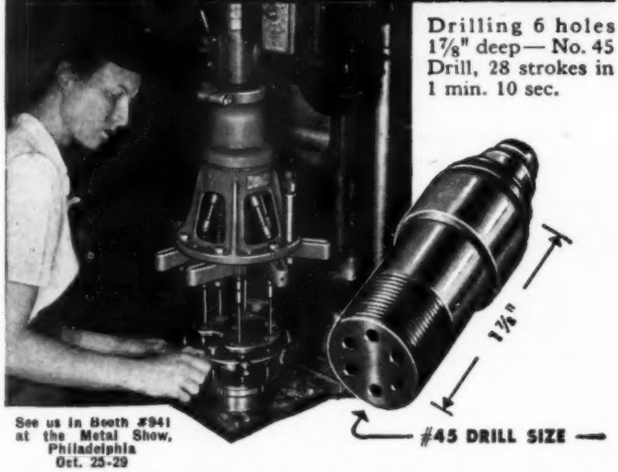
Capacity: Cylindrical Work from ⅛" to 1½" diam.
Abrasive Belt: 4" wide, 60" long.
Motor: 1 H.P., 1750 R.P.M.
Belt Speed: 3200' per min.
Platen: 4¼"x13½".
Floor Space: (vertical position): 26" x 21". (Horizontal position): 21" x 34".

Write for illustrated literature giving complete details.

See our exhibit—Space 1327—National Metal Exposition, Phil., Oct. 25-29

Production
MACHINE COMPANY GREENFIELD, MASSACHUSETTS, U.S.A.

"This multiple drill head has increased our torch cone end production by about 600%."



Drilling 6 holes 1⅞" deep— No. 45 Drill, 28 strokes in 1 min. 10 sec.

See us in Booth #941 at the Metal Show, Philadelphia Oct. 25-29

When this MULTI-DRILL went into operation with a seven-station full automatic step drilling machine, welding torch cone end production at the Victor Equipment Co., manufacturers of gas welding and flame cutting equipment, went up "about 600%."

Why not see how your production can be increased with a MULTI-DRILL—the production drilling head designed for accurate high speed drilling? Available with 2 to 8 spindles; quickly and easily adjusted to any hole pattern on or within a 9" circle; ½" min. center distances. Drill sizes 1/32" to ⅜". *Special adaptations available*

Write for details and name of your nearest Distributor

COMMANDER MFG. CO.

4229 W. Kinzie Street • Chicago 24

Product of *Commander* — Builder of the *Commander Tapper*

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your job.*

Who pays your company's advertising bill ?

PEOPLE WHO REGARD advertising as an economic waste are fond of pointing out that it's the *customer* who pays the bill.

And they are right.

The customer also pays for your power supply, your production tools, your plant maintenance, your salaries. All these are figured into the price of your product, along with the cost of your advertising.

Does this mean that the customer pays *more* for your product because it is advertised? Not at all. No more than he pays anything "extra" for the machinery on your production line!

The truth is, your production tools enable you to *reduce* your manufacturing cost-per-unit — and hence your price to the customer.

Advertising works the same way. For it is simply the application of assembly-line methods to the *manufacture of a sale.*

How can selling be mechanized? Just consider the five basic steps —

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

Advertising performs the first three of these jobs. And it performs them *far more economically* than any other means, leaving your salesmen free to concentrate their valuable time on the two jobs they alone can do, and do best.

As with any other capital investment, the yield from advertising depends on how *efficiently* it is put to work. But this much you can be sure of: nowhere does advertising work more efficiently than in business papers, with their tremendous concentration of hand-picked readers. Nowhere will your advertising dollar go so far toward reducing the cost of *manufacturing a sale!*

American Machinist

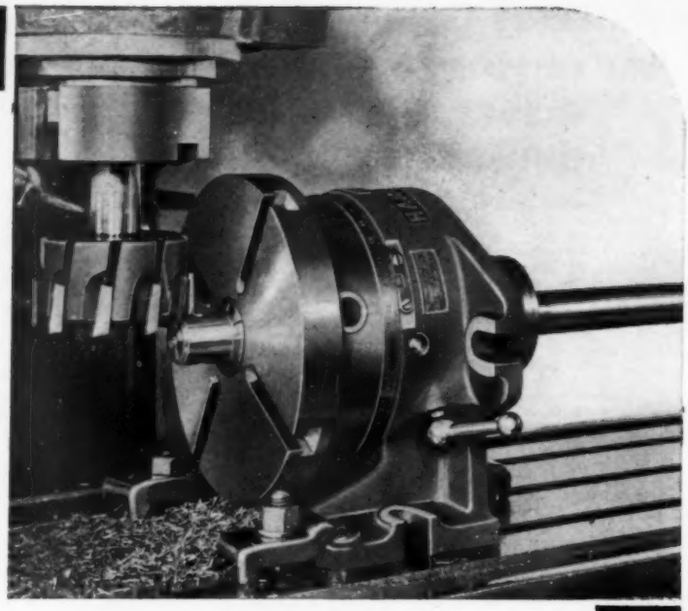
is a member of The Associated Business Papers, who have published an interesting folder entitled, "10 ways to measure advertising effectiveness." We'll be glad to send you a copy. And if you'd like reprints of this advertisement (or the entire series) to pass along to others in your organization, just say the word.

SUPER-SPACER

FOR

MILLING

The uses of the Super-Spacer in horizontal and vertical milling operations are unlimited. Here the Super-Spacer, mounted with a face plate and draw-in collet combination, shows its adaptability for milling bar stock. Investigate your present milling methods and see if your shop can't profit by the speed and accuracy of the Super-Spacer. For complete details write Dept. S2.



SPECIAL MACHINERY

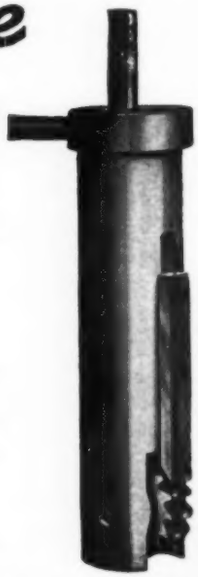
HARTFORD SPECIAL is equipped to build from prints almost any type of special machinery, parts or operations. Our facilities give your shop an added capacity. Bulletin E-200 gives complete list of our Machinery Equipment and capabilities. We'd be glad to send you one.

HARTFORD Special

THE HARTFORD SPECIAL MACHINERY CO. HARTFORD 5, CONN.

Investigate

THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER on Your Work



Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅞" to 12". It will keyseat in blind holes, and offset holes. We also manufacture oil-grooving millers.

WRITE today for Catalog No. 16

NATIONAL MACHINE TOOL CO.
CINCINNATI 22, OHIO

DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

Sensitive DRILLING MACHINES
Avey
CINCINNATI OHIO

LELAND GIFFORD
PRODUCTION ENGINEERS
at these Branch Offices will help you with your
— DRILLING PROBLEMS.

CHICAGO, ILL.
565 W. Washington Blvd.
DETROIT, MICH.
1533 Dime Bank Bldg.
CLEVELAND, O.
P. O. Box 5547
NEWARK, N. J.
Industrial Office Bldg.
ROCHESTER, N. Y.
Commerce Bldg.
WORCESTER, MASS.
for New England
LOS ANGELES 14, CAL.
724 South Spring Street

LELAND GIFFORD
WORCESTER 1, MASSACHUSETTS, U. S. A.

High Quality Steel is A MUST in cold Finished

THE uniformity of the high quality steel used in the manufacture of Youngstown Cold-finished Bars results in excellent machinability. Youngstown's steel makers have had many years of experience in producing these steels to the specifications which are ideal for screw machine products and many other uses. Youngstown Cold-finished Bars are produced in a wide range of shapes and sizes--straight lengths or coils. Phone, write or wire the nearest Youngstown District Sales Office and ask a representative to call and discuss your Cold-finished Bar requirements with you.

QUALITY · YOUNGSTOWN · SERVICE

Youngstown

COLD FINISHED CARBON AND ALLOY STEEL BARS

THE YOUNGSTOWN SHEET AND TUBE COMPANY General Offices — Youngstown 1, Ohio

Manufacturers of Carbon, Alloy and Yoloy Steel Export Office - 500 Fifth Avenue, New York

COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - TIE PLATES AND SPIKES - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS.

H&G DIE HEADS

WITH INSERT CHASER

FOR ALL MACHINES USED FOR CUTTING SCREW THREADS

The famous H & G Die Heads come in styles and sizes for all types of machines, including threading machines, chucking machines, drill presses, turret lathes, and automatic screw machines, such as Brown & Sharpe, Cleveland, Cone, Davenport, Economy, Foote-Burt, Greenlee, Gridley, Acme-Gridley, New Britain, New Britain-Gridley, Swiss, etc.

The small, inexpensive high-speed steel insert chasers are held by rugged carriers and cut threads straight and true to the close tolerances required.

The majority of expert production men prefer these die heads because of the ease with which insert chasers are resharpened and set, the low cost of insert chasers and the greater quantity of threads per grind and number of pieces threaded per chaser dollar.

The reduction in inventory will pay for new die heads. ***For example:*** **If you have $1,000 in chaser inventory, changing to H & G will require only $300, setting free $700 for the purchase of new H & G heads. This is due not only to low cost of chasers, but to interchangeability and long life.**

Send for Bulletin 32 "Selecting Proper Die Head for the Job."

THE EASTERN MACHINE SCREW CORPORATION

20-40 Barclay Street, New Haven, Conn.

Mfrs. General Purpose Die Heads, Insert Chaser Die Heads, Threading Machines.

---

the "swing" is to

SPECIAL MACHINERY

AND

the "orders" are going to —

"COLUMBUS DIE-TOOL"

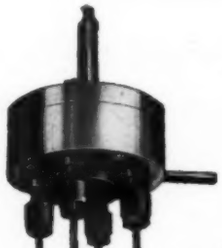
Because we have specialized for years in designing and building single purpose machinery, our "know-how" is unequalled. WE HELP TO KEEP YOU AHEAD OF COMPETITION by designing the right machine for the job. Send us your machinery and tooling problems.

JIGS • FIXTURES • SPECIAL TOOLS
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUNCHES AND DIES

COLUMBUS DIE·TOOL *and Machine Co.*
935 CLEVELAND AVE.,
COLUMBUS 1 OHIO
ESTABLISHED 1904

ERRINGTON MECHANICAL LABORATORY, Inc.

STAPLETON, STATEN ISLAND 4, N. Y.



Four Spindle
Fixed Center
Drill Head

MULTIPLE SPINDLE HEADS

ALSO FIXED CENTER TAPPING HEAD
AND ADJUSTABLE DRILLING HEADS
FOR CIRCLES AND STRAIGHT LINES.

WRITE FOR COMPLETE CATALOG.

Goss & De Leeuw

THE WORLD'S FINEST MULTIPLE SPINDLE

Chucking Machines

GOSS & DE LEEUW MACHINE CO.

KENSINGTON, CONN.

Only Reliable Products Can Be Continuously Advertised

BAUMBACH *The* DIE SET AUTHORITY

All Baumbach Die Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

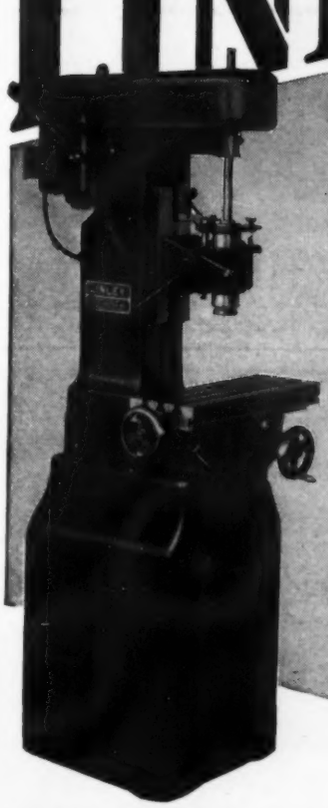
E. A. BAUMBACH MFG. CO., 1804 S. Kilbourn Ave., Chicago 23, Ill.

LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips MEANS MAXIMUM CUTTING EFFICIENCY

Manufactured by
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

LINLEY



MILLER AND JIG BORER

Handles a wide variety of toolroom jobs with speed, accuracy, efficiency . . . die work, jig and model making, drilling, reaming, milling. Releases larger machines for work better suited to their capacities. Easy set-up, quick changeover . . . velvet-smooth feed, eight spindle speeds from 275 to 4250 rpm. . . simple, direct micrometer setting.

FOR COMPLETE INFORMATION, WRITE FOR BULLETIN.

LINLEY BROTHERS CO., 664 STATE ST. EXTENSION BRIDGEPORT 1, CONNECTICUT

CARLTON RADIAL DRILL

FEATURES: 1. Low Hung Drive to Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all Speeds. 4. Concentrated and Convenient Push-button Controls. 5. Constructed on Unit Principle.

THE CARLTON MACHINE TOOL COMPANY

CINCINNATI 25, OHIO, U. S. A.

SHELDON

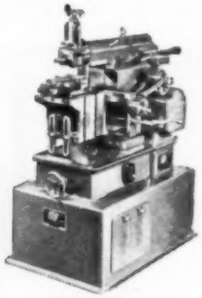
Makes ALL THREE

These 3 precision machine tools are a necessary part of every completely tooled shop . . . a modern precision lathe with "Zero Precision" tapered roller bearings that will retain its extreme accuracy at new high operating speeds . . . a convenient back-geared shaper that embodies all major improvements . . . a capable small milling machine that will do accurate work . . . all three are extremely moderate in price.

Write for Bulletins

No. 3000A Size "O" Milling Machine

No. TRBS-56 11" Lathe 1" Collet capacity



No. 8000 12" Shaper

SHELDON MACHINE CO. Inc.

Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers

4234 N. KNOX AVENUE CHICAGO 41, ILLINOIS, U.S.A.

HYDRAULIC PRESSES

30 to 1,000 Ton—Built to Order

Write for illustrated catalog

M & N MACHINE TOOL WORKS, INC.

152 ORONO ST. CLIFTON, N. J.

60 YEARS MANUFACTURING

Multiple Spindle Drilling and Tapping Machines — Automatic Drilling and Tapping Units — Multiple Spindle Attachable Drill Heads—Hot and Cold Swaging Machines—Hammering Machines — Tools, Jigs & Fixtures — Contract Work — Special Machinery

LANGELIER MANUFACTURING COMPANY, PROVIDENCE 7, RHODE ISLAND

Make a Time Study

OF

NICHOLSON EXPANDING MANDRELS

Time studies show that, with these widely used precision tools, operations can frequently be completed in less time than was formerly consumed in locating or turning a solid arbor. Set of 19 does work of 209 solid arbors. Two types. Sold singly or in sets; for bores ½" to 7". BULLETIN 1043.

W. H. NICHOLSON & CO., 114 Oregon St., Wilkes-Barre, Pa.

NO BLOWER or POWER NECESSARY

Pipe Burners

Nozzle Burners

Ring Burners

. . . Just Connect to Gas Supply

BUZZER Gas BURNERS

Reg. U.S. Pat. Off.

For Many Industrial Gas Uses

Designed to solve numerous Industrial Gas applications, "BUZZER" Burners are unexcelled for Efficiency, Economy, Simplicity and Flexibility. Large variety of models available.

Send for the "BUZZER" Catalog showing complete line of Industrial Gas Burners, Furnaces and other equipment.

CHARLES A. HONES, INC.

121 South Grand Avenue, Baldwin, L. I., N. Y.

A trade-mark does not *make* a product. The product must have proven its worth before the trade-mark which identifies it can be given favorable recognition. The esteem in which the symbol of the trade-mark is regarded will increase as the years roll on, if the product's standard of quality is maintained—even more so if quality has improved.

The diamond-enclosed *W & B* which is the trade-mark of century-old Whitman & Barnes carries greater prestige than ever before, for the fineness of the products it symbolizes is most highly regarded wherever drills and reamers are used!

1848 One Hundred Years of Fine Tools 1948

W&B

WHITMAN & BARNES

DETROIT

NEW YORK • CHICAGO • LOS ANGELES

FOR *Faster* PRODUCTION! *Precision* CONTROL!

Here's the new air pressure regulator that gives you everything you want for FASTER PRODUCTION, PRECISION CONTROL! It's the Hannifin "Air Warden" for use on all kinds of air operated equipment. You get fast, dependable action; quick build-up to desired pressure. Pressure setting repeats exactly regardless of fluctuating flow conditions. It's easy to back-off pressure without exhausting line — saves air! Complete line of sizes and models.

HANNIFIN
AIR WARDEN
REGULATOR

FOR PANEL MOUNTING—

MODEL PRD (Right). Equipped with flange for panel mounting. Adjusting knob extends through to front of instrument board — valve, itself, is back of board for convenience in making pipe connections. Regularly supplied with pressure indicating gauge for location on face of panel.

— WITH LOCKING FEATURE

MODEL LRD (Left). For installations where it is desirable to lock adjusting knob against unauthorized change of pressure setting. Locking disc arrangement permits very fine pressure adjustment. Use small common type padlock. All models available in ⅜" and ½" sizes. For primary pressures to 150 p.s.i. and for reduced pressures of from 5 to 125 p.s.i. Ask for latest bulletin.

HANNIFIN CORPORATION
1101 So. Kilbourn Ave., Chicago 24, Ill.
AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES
PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES

MATCO-*The Wheel Dresser That Really Saves Time!*

SAVES TIME by ELIMINATING

1. Removing and replacing work on the chuck
2. Lowering and raising wheel head
3. Wheel and Diamond accidents
4. Locating diamond for dressing

Dresser Compensated For Wear

BUILT BY TOOL AND DIE MAKERS

For Surface and Cylindrical Grinders

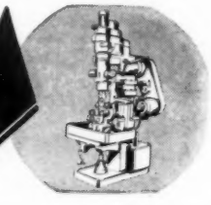
• *Sent on 5-Day Approval at No Cost to You*

MATCO TOOL COMPANY
2830-36 W. LAKE STREET CHICAGO 12
Mfrs. Complete Line of Precision Vises — Dressers

PRESSES
FEEDS
AUTOMATIC EQUIPMENT
THE V&O Press Co.
HUDSON N.Y.

Built for continuous production
Write for full information

KAUFMAN TAPPING MACHINES



KAUFMAN MFG. CO.
Manitowoc, Wisconsin

HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

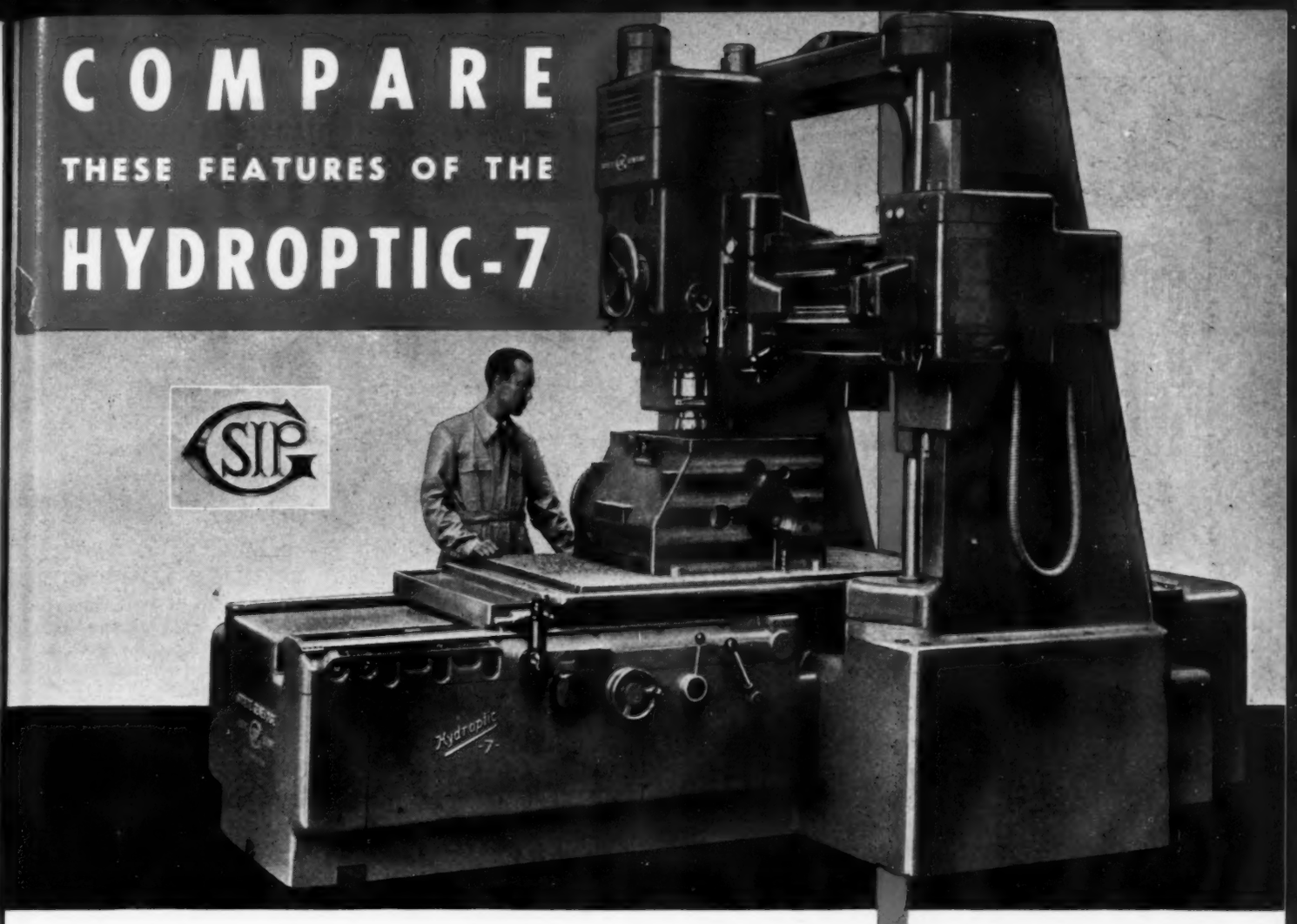
MODEL D-1 DIAL TYPE
Write for Circular!

THE SHORE INSTRUMENT & MANUFACTURING CO., INC.
9025 VAN WYCK AVENUE
JAMAICA, NEW YORK
TELEPHONE: JAMAICA 6-4090

COMPARE

THESE FEATURES OF THE

HYDROPTIC-7



SPECIALISTS in the manufacture both of precision measuring equipment and machine tools, SIP combines these skills to produce a Jig Boring and Milling Machine with outstanding accuracy as well as high productive capacity. Even on the largest work capable of being placed on the table, the SIP optical measuring system assures guaranteed accuracy for all settings to 0.0002". This unique measuring system consists of standard scales graduated on SIP equipment, enclosed in the table and spindle saddle, and read by built-in microscopes having a magnification of 45x. This system eliminates all wear and mechanical stress, assuring permanent accuracy and making it possible to duplicate any setting at any time.

The spindle revolves in specially built SIP tapered roller bearings, and runs true to within 0.0005". Guiding rollers on table and bed ways minimize friction and wear. With the multiple remote control, all operations can be controlled from either side of the bed or from the cross-rail, reducing unproductive time to a minimum. Hydro-electric traverse of the cross-rail and automatic clamping is controlled by a single lever. Hydraulic table motion gives a stepless range of milling feeds and a rapid traverse movement.

Features like these have made Hydroptic Jig Boring and Milling Machines the world-wide standard for accurate machining and measuring. Our engineers will be glad to furnish specific details of how Hydroptics can improve the efficiency and accuracy of your work. Send us details of your requirements.

SPECIFICATIONS

TABLE

Table Working Surface	61½"x40½"
Hydraulic Table Travel	52"
Hydraulic milling feeds up to	12" per min.

SPINDLE

Transverse travel of vertical spindle head	40"
18 working speeds	40—2000 RPM
8 spindle feeds	0.0005"—0.012" per rev.
Maximum distance table top to spindle nose	38"

CAPACITIES

Maximum load allowed	4500 lbs.
Drilling capacity in cast iron	2⅜"
Boring capacity	10"

MEASURING SYSTEM

Reading on microscopes drum:	0.001"
vernier:	0.0001"
SIP optical measuring system on table and spindle guaranteed accurate to	0.0002"

Also—the Hydroptic-B with table working surface 39½" x 32", and the Hydroptic-8 with table identical to the Hydroptic-7 and equipped with both horizontal and vertical spindle heads.

COSA CORPORATION

624 CHRYSLER BUILDING
NEW YORK 17, NEW YORK

COSA

Representatives for SIP in the United States and Canada

IRIDITE *gives*

YOUR ZINC DIE CAST PRODUCTS
lasting corrosion protection
...better paint adherence...
colorful, *salable* finishes

By a simple quick dip, manually or in automatic machines, Iridite provides a triple-purpose finish on zinc die cast products—Iridite gives you—

CORROSION RESISTANCE...for protection from air, water, gasoline, other harmful corrosives.

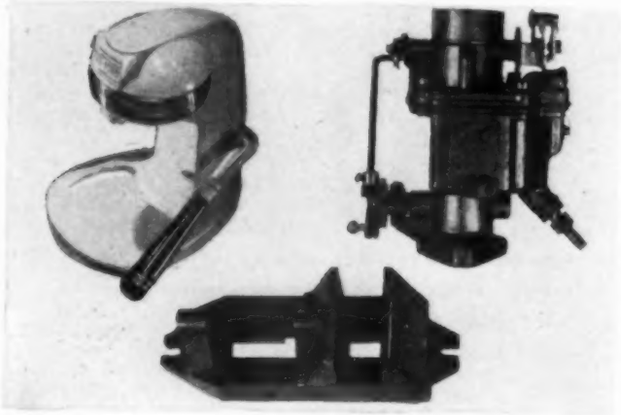
PAINT ADHERENCE...to vastly increase corrosion resistance and to secure a paint system that defies chipping, flaking, peeling

EYE APPEALING COLOR...that protects the product on the shelf, draws the customer's eye.

Iridite is a non-electrolytic chemical process, used and approved by leading manufacturers. If your products use zinc die cast parts, write today for information on how Iridite can help you make a better, more salable product.

JUICER — Fruit juicer, finished with Iridite to insure permanent adherence of sparkling enamel finish.

CARBURETOR — Automobile carburetor, finished with Iridite for protection against corrosion from gasoline, fuel line moisture.



VISE—Bench vise, finished with Iridite to provide permanent blacking and corrosion protection.

Allied Research Products, Inc.
101 CHEMICAL BLDG.
4004 E. MONUMENT STREET • BALTIMORE 5, MARYLAND

FREE TRIAL OFFER
NO STRINGS ATTACHED

A VALUABLE KIT
Carton contains 6 grades of ultra-fine quality, assorted fine grit abrasive compounds suitable for a variety of work. Coarser grit compound can also be supplied.

6 LIBERAL JARS DIFFERENT GRADES

FOR PRECISION LAPPING
Here's a get-acquainted offer you cannot afford to miss. Among these samples will be found the answer to many a tool room lapping problem. Hard and soft abrasives for all kinds of lapping needs. Sent post paid anywhere in the U.S.A. and Canada. No obligation—write today.

OFFER LIMITED *Write today*

PROVE THEM AT OUR EXPENSE!

UNITED STATES PRODUCTS CO.
524 MELWOOD ST. USP PITTSBURGH, PA.

WILSON M.I. STANDARDIZING LABORATORY

...where hardness testing ACCURACY begins

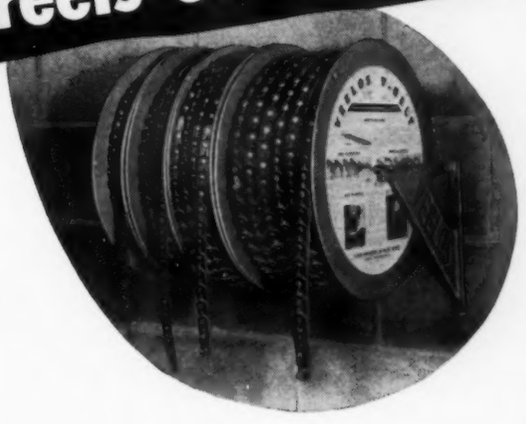
● Only WILSON makes the "ROCKWELL" Hardness Tester, the "TUKON" Hardness Tester and the "ROCKWELL" Superficial Hardness Tester. Universal acceptance of and confidence in these instruments — as well as Wilson-made "BRALE" diamond penetrators, KNOOP and 136° square base pyramid diamond indenters and test blocks — are founded on the dependable accuracy of all Wilson products. This accuracy is rigidly maintained by the WILSON STANDARDIZING LABORATORY.

See these machines and accessories at our Booth #116 at the Metal Show.

WILSON ACCO
MECHANICAL INSTRUMENT CO., INC.
AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.
230-B PARK AVENUE, NEW YORK 17, N. Y. TRADE MARK

Everyone of these v-belt sizes

can be replaced with 4 reels of Veelos



No matter how big your present V-belt inventory, you can drastically cut it with just 4 reels of Veelos. These handy reels give you a choice of more than 316 sizes in O, A, B and C widths. If you use only A and B sizes, just 2 reels of Veelos will provide you with a complete V-belt inventory. Any length belt is quickly uncoupled from a reel, made endless, then installed.

As soon as you specify Veelos on reels, you can stop stocking matched sets of endless belts. You can forget belt deterioration and obsolescence. Veelos on reels saves storage space . . . simplifies inventory records.

Veelos goes on fast . . . lowers machine downtime. On drives with outboard bearings it is installed without moving the motor or dismantling the machine. Veelos is made in all standard sizes . . . fits all standard grooves . . . is available in 100 foot reels. Sales engineers in principal cities; over 300 distributors throughout the country.

VEELOS
THE LINK
V-BELT

New Veelos Catalog... How Veelos on reels makes big V-belt inventories little is just one of the many features in the new Veelos catalog. All the facts and full engineering data are given. Write for your copy today.

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PENNSYLVANIA

VEELOS is known as VEELINK outside of the United States

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

For Faster Smoother Cleaner Grinding ECONOMY

Grinding and Cutting Oils and Lubricants for Every Metal Working Purpose

THE WHITE & BAGLEY COMPANY
WORCESTER 8, MASS., U.S.A.

Die-Making Machines

They save 50% on sawing, filing and lapping operations, easily maintaining .002" limits. Ask for special bulletin—also circulars on Drill Grinders, Point Thinners, Tool and Cutter Grinders, Face Mill Grinders and Tool Bit Grinders.

OLIVER OF ADRIAN PRODUCTS

Oliver Instrument Co., 1414 Maumee St., Adrian, Mich.

LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946

Of American Machinist published Bi-weekly at New York, N. Y., for October 1, 1948.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. A. Gerardi, who having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Company, Inc., publishers of American Machinist, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, weekly, semiweekly, or triweekly newspaper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the act of August 24, 1912, as amended by the acts of March 3, 1933, and July 2, 1946 (section 537, Postal Laws and Regulations), printed on the reverse of this form, to wit:

1. That the name and address of the publisher, editor, managing editor, and business manager is: Publisher, McGraw-Hill Publishing Co., Inc., 330 Wst 42nd St., New York 18, N. Y.; Editor, Burnham Finney, 330 West 42nd St., New York 18, N. Y.; Managing editor, E. J. Tangerman, 330 West 42nd St., New York 18, N. Y.; Business manager, W. E. Kennedy, 330 West 42nd St., New York 18, N. Y.

2. That the owner is: McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York 18, N. Y. Stockholders holding 1% or more of stock: Curtis W. McGraw, Executor of the Will of James H. McGraw, 330 West 42nd St., New York 18, N. Y.; James H. McGraw, Jr., 330 West 42nd St., New York 18, N. Y.; James H. McGraw, Jr., Curtis W. McGraw and Willard T. Chevalier, Trustees for: Harold W. McGraw, James H. McGraw, Jr., Donald C. McGraw, Curtis W. McGraw, 330 West 42nd St., New York 18, N. Y.; Edwin S. Wilsey and Curtis W. McGraw, Trustees for James H. McGraw, 3rd, Madison, New Jersey; Curtis W. McGraw, 330 West 42nd St., New York 18, N. Y.; Donald C. McGraw, 330 West 42nd St., New York 18, N. Y.; Mildred W. McGraw, Madison, New Jersey; Grace W. Mehren, 536 Arenas St., LaJolla, Calif.; Jacob L. Hain, 1 North 5th St., Reading, Pa.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, morigages, or other securities are: none.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the empany as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

J. A. GERARDI, Secretary
McGRAW-HILL PUBLISHING COMPANY, INC.

Sworn to and subscribed before me this 24th day of September, 1948.

[SEAL] ELVA G. MASLIN
(My commission expires March 30, 1950)

THREAD AND FORM ROLLING TOOLS and MACHINES EXCLUSIVELY!

REED Cam-Actuated, Triple Die THREAD ROLLING MACHINES

REED Cylindrical and Flat THREAD ROLLING DIES

REED KNURLS

REED THREAD ROLLS

A Complete THREAD ROLLING SERVICE

At your disposal—the skill, experience and equipment of an organization devoted exclusively to the design and manufacture of thread and form rolling tools, machines and accessory equipment. Send us specifications of your work.

800 Pieces Per Hour

PHONOGRAPH WORM

Thread: 9/16"—24 Diametral pitch, 14½° pressure angle.

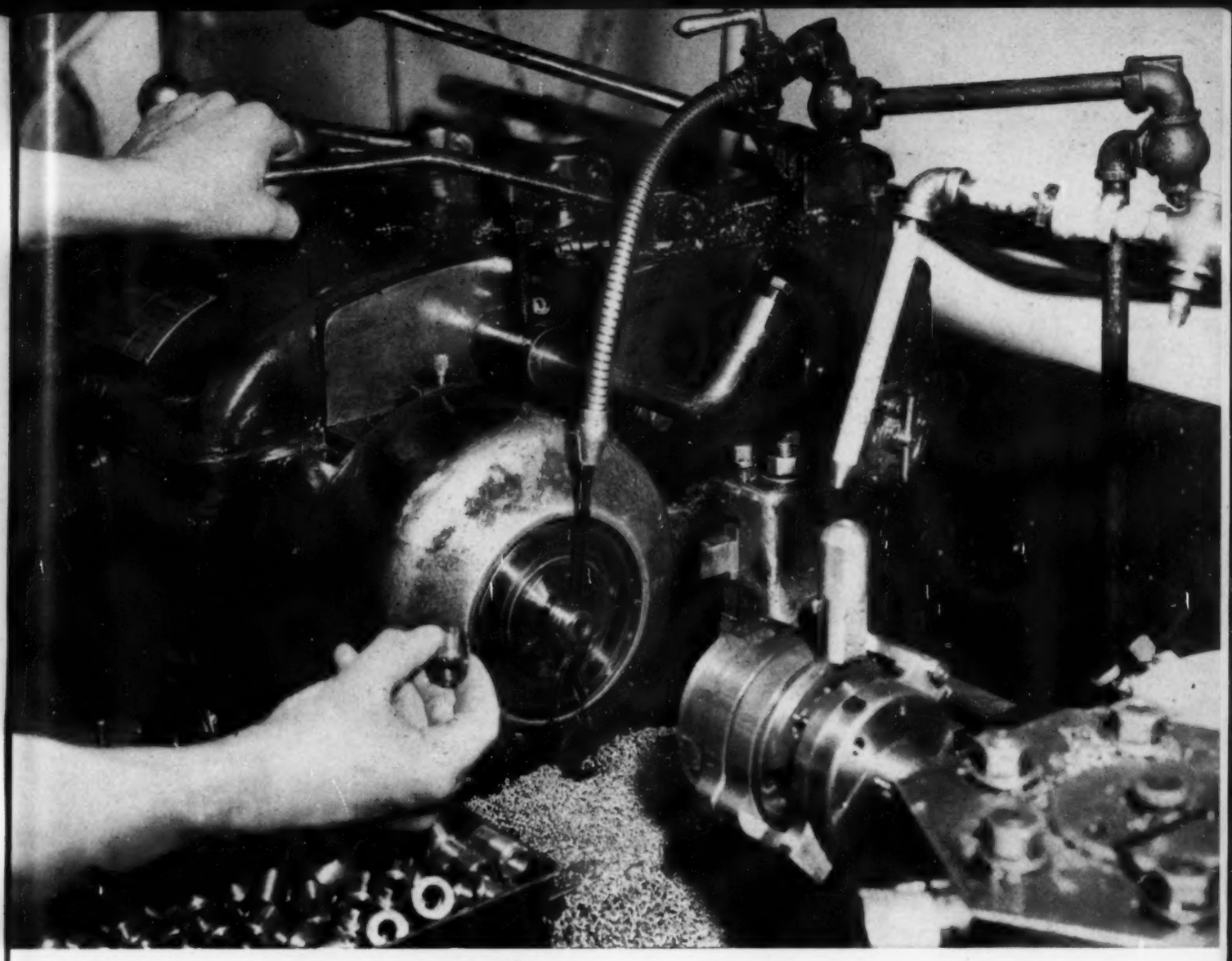
Material: Bronze

Remarks: The use of three cylindrical dies provided a superior finish on the worm thread that eliminated undesirable transmission noises in the worm assembly.

Rolled on REED Cam-Actuated, Triple-Die THREAD ROLLER

Send for General Bulletin 5-1

REED ROLLED THREAD DIE CO.
Manufacturers of
THREAD ROLLING MACHINES AND DIES—
KNURLS—THREAD ROLLS.
WORCESTER 2, MASS., U.S.A.
REED



See what a shift in cutting oil did here...

A simple shift to Acme Cutting Oil brought remarkable results at the A. B. Heller Screw Products, Detroit. Production on hand screw machines increased 29% and tool grinding was cut ⅓. The material machined is 18-8 free-machining stainless steel.

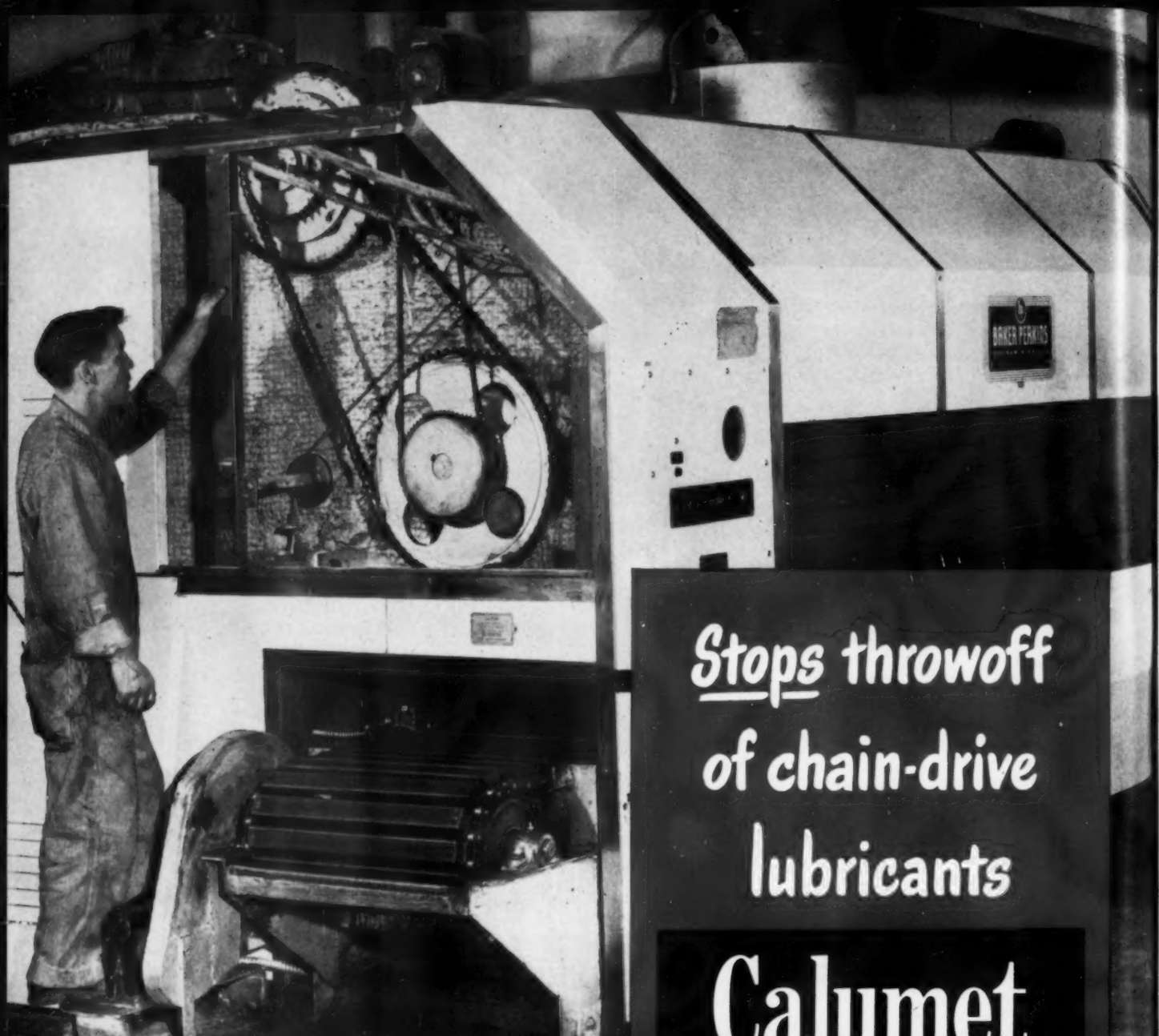
Here is a tabulation of the results:

	Acme Cutting No. 110	Former Oil
R. P. M.	442	350
Surface Speed, ft. per min.	116	90
Depth of Cut, in.	3/16	3/16
Length of Cut, in.	4-7/16	4-7/16
Feed per Rev., in.	.0045	.0045
Pieces Per Hour	18	14
Pieces Per Tool Grind	155 pcs.	48 pcs.
Finish	Very smooth	Fair

This change in cutting oil was made after the job was discussed with a Standard Cutting Oil Engineer. Perhaps one of these engineers can bring equally good or greater savings to your machining operations. If your plant is located in the Middle West, write Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Ill., for the engineer nearest you.

ACME CUTTING OIL

STANDARD OIL COMPANY (INDIANA) STANDARD



Stops throwoff of chain-drive lubricants

Calumet
Viscous Lubricants

A Midwest food processor faced the problem of discontinuing all lubrication of mixer and oven drives. No lubricant that was tried would stay on the gears and chains. The possibility of product contamination was a continual hazard.

On the other hand, the maintenance engineer realized that excessive wear and noisy operation would result if these drives were run dry. It appeared that some special-purpose lubricant was needed. He put the problem up to a Standard Oil Lubrication Engineer.

The engineer's solution was simple. No costly special-purpose lubricant was required. He recommended Calumet Viscous Lubricant 5-X—a product which was designed to stay on drives under high temperatures. This lubricant eliminated throwoff, even on the top oven chains, which had been particularly difficult to lubricate.

Before you resort to extreme measures for solving any lubricating problem, call a Standard Oil Lubrication Engineer. You'll find that his help offers a simple, effective solution to practically any lubricating problem, and he has a complete line of industrial lubricants. If your plant is located in the Middle West, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, to secure the services of the engineer nearest you.

STANDARD OIL COMPANY (INDIANA)

STANDARD

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your job.*

How advertising puts money in your pocket

WHEN YOUR COMPANY invests in a new machine, they can figure almost to the penny what they'll get back in better production.

By reducing the manufacturing cost per unit, the new machine increases your company's chance to earn a profit. Your workers can earn more because they're *producing* more. That's the only way your company can put more money into everybody's pocket – including yours.

The same principle applies to advertising.

For advertising works just like a machine. By mechanizing part of the selling process, advertising reduces the cost of *manufacturing a sale.* And that, too, means more money in everybody's pocket – including yours.

What does it take to "manufacture" a sale? Usually, there are five basic steps involved:

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

Any good salesman could handle all five. But no salesman should *have* to – not when advertising can perform the first three for him, and do them so much more *economically.*

Especially is this true of advertising in the business press. Nowhere else does the machinery of advertising operate so efficiently. Nowhere else does it go so far toward reducing the cost of manufacturing a sale!

American Machinist

is a member of The Associated Business Papers, who are sponsoring this campaign. If you'd like reprints of this advertisement, or the entire series, to pass along to others in your organization, we'll be glad to mail them to you.

CONTRACT WORK

INTERNAL and EXTERNAL GRINDING

★ ★

HARDENED and GROUND SCREWS a SPECIALTY

★ ★

Quick serice.
Send blueprints.

PORTAGE MACHINE COMPANY
1031 SWEITZER AVENUE — AKRON 11, OHIO

NUESKE TOOL & MACHINE CORP.

solicited by one of the oldest and largest tool and die houses in the East.

Complete Engineering Staff Available to assist or initiate your projects. Special Machinery Designed and Built to Your Specifications.

Reputable and established concerns invited to send inquiries.

NUESKE TOOL & MACHINE CORP.
45-18 COURT SQUARE — LONG ISLAND CITY 1, N. Y.
Tel.: STillwell 6-2550

KAMIS Engineering Company

Designers & Manufacturers of Tools & Machinery

Special machine work; facilities available for production quantities of small, medium and large machined parts, assemblies and fabrications. Specializing in stainless steel aviation gas turbine parts.

Send for Brochure No. 3 which describes our facilities in detail.

300 MOORE STREET
PHILADELPHIA 48, PA.

The Lowest Possible Die Cost For...

STAMPINGS

IN SMALL LOTS

DAYTON ROGERS MFG. CO.
Minneapolis 7, Minnesota

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them.
GENERAL PATTERN WORKS
2233 Buck Street — Cincinnati, Ohio

PREMIER MILL CORP.
GENEVA, N. Y.

Facilities available for production manufacturing of small precision parts; building and assembling special machines, small tools, jigs, fixtures, etc. Experience in special alloys such as Stainless Steel, Hastelloy, Ni-Resist, etc. *Inquiries Welcomed.*

Equipment List Sent on Request

F. F. SLOCOMB CORPORATION
Wilmington 99, Delaware

Builders of Special Machines a Specialty. Facilities Available for Production. Quantities of Small and Medium Precision Parts.

Equipment List on Request

ORANGE PATTERN WORKS
1861 S. Orange Grove Ave.
Los Angeles 35, Calif.
Specializing in Small Wooden Patterns
ACCURATE WORK — QUICK SERVICE
Send Blue Prints for Free Estimates.

SEARCHLIGHT SECTION

SALES ENGINEER

Gear manufacturer wants representatives for following states. Must be familiar with mechanics of precision gears.

Give complete personal and background details, reference and experience in application.

NEW ENGLAND; NEW YORK STATE
PENNSYLANIA; MARYLAND; TEXAS
OHIO; ILLINOIS; MICHIGAN

S. W. 4544, American Machinist
330 W. 42nd St., New York 18, N. Y.

REPLIES (Box No.):
Address to office nearest you.
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

MECHANICAL ENGINEER—Opening in Chattanooga. Should have at least two years experience in design and drafting, and be capable of checking drawings for accuracy. Opportunity offered for developing into Product Engineer. Write full details of qualifications and enclose photos, (non-returnable). P-6504, American Machinist.

WANTED—MASTER die and toolmaker—must be familiar and experienced in the cutting of embossing dies as well as the making of deep drawing metal shells and thread rolling equipment for hollow ware. Splendid opportunity to become interested in a going business. Give detailed experience. P-6630, American Machinist.

SELLING OPPORTUNITIES OFFERED

MFG. AGENTS for complete end mill line. Must have allied lines. Successful background cutting tools. Territories open; Illinois, Wisconsin, Missouri, Texas, New England, West Coast. RW-6335, American Machinist.

SALES ENGINEER well acquainted industrials North Jersey, New York metropolitan area can handle additional line. A-1 tools exclusive sales, commission basis. SA-6751, American Machinist.

EMPLOYMENT SERVICES

SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service 38 years recognized standing and reputation. The procedure of highest ethical standards is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby Inc., 266 Dun Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

CHIEF ENGINEER or assistant position. Twenty years experience in all matters pertaining to the design and development of industrial and consumer products. Thorough knowledge of manufacturing methods. Wide experience in originating and developing successful new products, modernizing existing lines and supervising detailing for practical mass production. Electric appliances, power tools, mechanical and electrical devices. College graduate, age 45. PW-6502, American Machinist.

PRODUCTION EXECUTIVE: Metal stampings; screw machine products; castings. High speed progressive die, and deep drawn stampings. Parts assembly. Lacquered; painted, and plated finishes. Unusual ability to handle labor. PW-6615, American Machinist.

PLANT SUPERINTENDENT—Manager, M.E. background. 20 years experience in design, manufacturing, labor relations, management. Good record, efficient, reliable, desires responsible position in small or medium size company. PW-6515, American Machinist.

PATENT ATTORNEY

Patent Practice

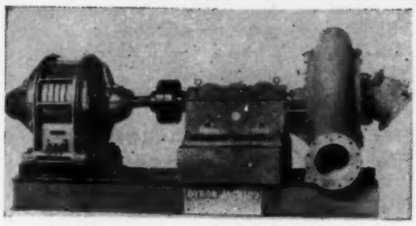
before U.S. Patent Office. Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine and Rommel Registered Patent Attorneys. Suite 453, 815-15th Street, N. W. Washington 5, D. C.

BUY FROM STOCK
Telephone
MAIN 6347-6348

FALK
MACHINERY COMPANY

18 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented



Nebel 20"-40"x8' Geared Head Quick Change Gear Extension Bed Gap Lathe. 3/60/220 volts motor driven. Taper Attachment, faceplates, chuck, tailstock, plus Hexagon Turret with power feed. Immediate delivery.

ENGINE LATHES

36"x30' LeBlond Geared Hd. Motor Dr.
32"x28' Bridgeford, Geared Head, M. Dr.
32"x16' Bridgeford, Geared Head, M. Dr.
28"x10' Davis Quick Change Gear
26"x18' Bridgeford, Geared Head, M. Dr.
25"x14' LeBlond Motorized
24"x18' American Q.C.G. Grd. Hd. 11' centers, Taper Attach. Motor Dr. Equipment
24"x14' Lodge & Shipley, Motorized
24"x16' American Motorized
24"x12' Putnam, Quick Change Gear
24"x10' LeBlond, Quick Change Gear
21"x18' LeBlond, Motorized
20"x11' Schumacher-Boye, Q.C.G.
20"x10' American, Q.C.G. 72" centers
20'x10' Hendey, Q.C.G. motor dr.
20"x8' Lodge & Shipley, Q.C.G. M. Dr.
18"x10' American Geared Head
18"x10' Davis, Q.C.G. M. Dr.
18"x8' Davis Q.C.G. 42" centers, equipment
18"x8' Lodge & Shipley, geared head
18"x8' Hendey Q.C.G. 49" centers
18"x7' Lehman, Q.C.G. M. Dr.
18"x6' American, Geared Head, M.D.
16"x8' Hendey Q.C.G. M. Dr.
16"x6' Lodge & Shipley Geared Head
14"x8' Rockford, Q.C.G. Collets
14"x6' LeBlond, Q.C.G. M. Drive
14"x6' Mulliner-Endlund, M. Drive
14"x6' Hendey, Q.C.G. M. Drive
14"x6' Rockford, Q.C.G. M. Drive
13"x5' South Bend Q.C.G. 30" centers
12"x30" American Wood Spinning
12"x5' Sidney, Geared Head
12"x5' Hendey Q.C.G. M. Drive
12"x5' Sebastian Q.C.G. Grd. Hd.
12"x3' Craftsman, Bench, M. Drive
12"x18" Porter-Cable Carbo-Lathe
11"x4' Sidney, Q.C.G. Floor Type

TURRET LATHES

Morey #2 Geared Head 1" Cap., M. Dr.
Simmons Microspeed 1" Cap., M. Dr.
Oster #601 Hand Screw Machine 1½" cap.
W-Swasey #4 Univ. 1½" cap., M. Dr.
Jones & Lamson #3 Univ. Bar Feed, 1½"
W-Swasey #3 Univ. 1½" cap., M. Dr.
Gisholt #4 Univ. 2" cap., M. Dr.
W-Swasey #2A Univ. 2½" Cap., M. Dr.
Bardons & Oliver #7, Univ. 2½" Cap.
W-Swasey #3A Univ. 3½" cap., M. Dr.

BENDING ROLLS

San Angelo, initial type 6' x 16 ga.
Niagara, initial type 12' x ⅛"
Hendley-Whitmore 6' x 3/16"
Dekom Angle Bending, 3 x 3 x ⅜, M. Dr.

METAL ROUTERS

Onsrud Double Spindle Radial Arm #A2DD 108" Arms with frequency Converter for 3/60/220
Onsrud #W-255 Universal Heavy Duty Single Spindle Router, with all steel table 54"x36" with T-slotted edges.

New & Used Motors
All Sizes IN STOCK

GRINDING MACHINES

J & L #TG-615 Automatic Thread, M. Dr.
Norton 6x18 Vert. Surface, Excello Spindle
Norton 6x18 Horiz. Surface, Excello Spindle
Brown & Sharpe #2 Auto. Surface, 6x18
Pratt & Whitney 14x36 Vertical Surface
Blanchard #16, 30" Vertical Surface
Thompson Hydraulic Horiz. Surface
Abrasive Automatic Surface, 22x8
Reid #2 Automatic Surface, 6x18
Norton Hydraulic Horiz. 6x36
Heald #25 Rotary Surface
New Leach 6x12 Horiz. Surface, 3/60/220 volts
Brown & Sharpe #2 Face, motorized
Rivet #3 Internal, Cone driven
Heald #70 Internal, Belt drive
Heald #60 Internal, Belt drive
Norton #2 Univ. Tool & Cutter, Belt Dr.
Cincinnati #1½ Univ. Tool & Cutter, Belt Dr.
Oakley #3 Tool & Cutter, Belt Dr.
G & Livingston #4 Tool & Cutter
Cincinnati #2 Tool & Cutter, M. Dr.
Cincinnati "Monoset" Tool & Cutter
Cincinnati #2 Centerless, M. Dr.
Gorton Dble. End Disc, 18" dia. discs
Besley Dbl. End Disc, 30" dia. discs
Greenfield #12 Internal Hydraulic
Cincinnati #2 Univ,. Cylindrical 6x36
Brown & Sharpe #10 Cylindrical 6x18
Brown & Sharpe #11 Cylindrical 10x30
Brown & Sharpe #4 Univ. Cylindrical 12x60
Brown & Sharpe #5 Plain Cylindrical
Oliver of Adrian #51 Drill Grinders

AUTOMATICS

No. 0 & No. 00 Brown & Sharpe
No. 0 Brown & Sharpe Automatic Cutoff
#2 Brown & Sharpe High Speed Automatic. Turner Drive.
1—1¼" Cone 4-spindle Automatic M.D. Threading Spindle
Cleveland Model "A" 3¾" Single Spindle. Motor driven.

PUNCH PRESSES

Caldwell 200 tons Horiz. Hydr. Wheel Press.
Ferracute No. EG52 Coining Press. 150 tons. Up moving ram. 2¼" Stroke
General Flexible Power Press. 8 tons, M. Dr.
Stiles O.B.I. 14 tons, 1½" stroke.
Michigan O.B.I. 36 tons cap. 2" stroke. Wide Ram, wide Bed. Motor driven
Bliss No. 68C Dbl. Action, Gap Frame.
Lucas 15 tons, Power Arbor Press. M. Dr.
Hub O.B.I. 15 tons, 2" stroke, M. Dr.
Tompkins & Johnson Power Arbor Press. 3½" Stroke. Cap. 6500#
McCall No. 4 O.B.I. 2½" stroke, 25 tons.
NEW Johnson O.B.I. Presses. Al lsizes.
Bliss #305 Geared S.S. Single Action
Nilson 56 tons S.S. Dbl. Crank 3-Die Transfer Press
Bliss #18, #20 O.B.I. Motorized

SHEARS

Bliss #109 Slitter, 10 ga. cap.
Pexto #571 Slitter, 3/16" cap.
Wais & Roos 10' x ¼", 15' gap.
NEW Famco 36"x18 ga. Squaring
Pexto Foot squaring 30" x 22 ga.
Ohl 6' x 14 ga. Motor driven Squaring Shear. With gauges & extra blades.

Sutton #2 Straightening Machine. Cap. ¾" to 3½" tubes or solids. 50 h.p. 3/60/220 volts motor drive.

BROACH

Oilgear, Horizontal Hydraulic Type #XA. Capacity —20,000#, 56" stroke. Motor driven. Coolant system and hydraulic system

MILLING MACHINES

Vernon #0 Hand, Late Type, M.D.
Nichols Hand, Late Type, M.D.
Sundstrand #0 Rigidmil, M.D.
Whitney #6 Hand, Cone Drive
Hardinge B.B. Vertical, Bench
Bickett #1 B.B. Vertical, Bench
Ames Universal Horiz. Bench
Becker #5C Vertical, Cone Dr.
Knight #1½C Vertical
Cincinnati #3 & #4 Vertical
Cincinnati #2 Univ. Horizontal
Cincinnati #3S Univ., Horizontal
Cincinnati #3, #4, #5 Pl. Horiz.
Cincinnati #2M Univ. Horiz.
Brown & Sharpe #0, 1, 1Y Horizontal
Brown & Sharpe #2 Univ. Horiz.
Brown & Sharpe #1D Univ. Horiz.
Brown & Sharpe #3 Univ. Horiz.
Kempsmith #1, #2 Plain Horiz.
Cincinnati 18" Mfg. Plain
Garvin #14 Plain Horizontal
Milwaukee #2K Vertical, M. Dr.
Milwaukee #3K Vertical, M. Dr.
Milwaukee #1½ Dbl. Overarm, Horiz.
Milwaukee #2B Dbl. Overarm, Horiz.
Milwaukee #2B Universal Horiz.
Milwaukee #3B Plain Horizontal
Brown & Sharpe #12 Production, M. Dr.
Pratt & Whitney #2 Duplex, Motorized
Van Norman #2 Duplex, Motorized
Cincinnati #0-8 Vertical, M. Dr.
Cincinnati #0-8 Plain Automatic
Cincinnati #0-8 Rise & Fall
Cincinnati #2-18 Plain Automatic

Cincinnati #5 Horizontal Hi Power Milling Machine. With rectangular overarm. All geared speeds & feeds. Single pulley drive. Range—50'x14"x21". Immediate Delivery, (2 Available.)

SHAPERS & PLANERS

Shaper—Pratt & Whitney Vertical 6" with Rotary table & motor drive.
Shaper—Logan 7" Horizontal. NEW
Shaper—Machinery Sales 16", motorized
Shaper—Gould & Eberhardt 16", motorized
Shaper—Smith & Mills 16", motorized
Shaper—Smith & Mills 16" Universal
Shaper—Potter & Johnston 16", Universal
Shaper—American 24" crank, motorized
New Haven 12" Slotter, motorized
Planer—Whitcombe 24x24x6 motorized
Planer—Shaper—Niles-B. Pond 20x20x24
Planer—Betts 72x60x30 Modern 4-Head
Planer—Betts 72x60x25 Modern 4-Head
Planer—Betts 122x72x34 Modern 4-Head

DRILLING MACHINES

American 8' Triple Purpose Radial, M. Dr.
Cinci-Bickford 6' Arm, 15" col. Radial
Cinci-Bickford 5' Arm, 13" col. Radial
Demco 4-Spindle Drill #2 M. T. M. Dr.
Fosdick 5" Arm 14" col. Radial
Natco #12, 20 Spdle. Multiple, 3/16" cap.
Fox #15, 54 Spdle. Multiple, #1 M.T.
Minster #2D Single Spindle Upright Heavy Duty 2½" cap. Compound Table. Motorized
Canedy-Otto 21" Single Spdle. Late Type
Cinci-Bickford 21" Drilling & Tapping, #3 m.t.
Buffalo Forge #2MS Drill. Late Type
Barnes 22" Backgeared Upright Single Spdle.
Leland-Gifford #2MS, 2-Spindle Upright
Edlund #2B, 4-Spindle Upright, #2 m.t.
NEW Buffalo Forge #15, #18 Single Spdles.

Bradley 200# Rubber Cushioned Helve Hammer. Single pulley drive. 225 to 240 blows per minute. Stroke adjustable from 1" to 5½". Separate adjustable anvil. Total weight—10,200#. Price—$1850.00 net fob Rochester, N. Y.

LATE TYPE EQUIPMENT

DRILLS

Radial—3' 11" column CANEDY-OTTO—1942
Radial—3' AVEY Sensitive—old style
2 Spindle—ALLEN-15" overhang—mtr. on spindle—1942

GRINDERS

Centerless—#2 CINCINNATI—Filmatic—1942
Cam—10"x24" NORTON Special
Cylindrical—6"x18" NORTON Plain Hydraulic—1941
Cylinder—#60 HEALD
Internal—IG-12 GRENBY High Speed—1942
Surface—6"x18" REID—#2B Motor Spindle—NEW
Surface—6"x18" REID—#2A Mtr. in Base—1942
Surface—6"x18" THOMPSON Model F—Hydraulic—1942
Surface—6"x18" ROBOT—Auto.—mtr. driven—1941
Surface—6"x18" COVEL #20 HYDRAULIC—Wet Attach.—1942
Surface—12"—#A3 ARTER Rotary—Power elevation table—1944
Tool & Cutter—#1½ CINCINNATI—Belt Drive
Tool & Cutter—#2 CINCINNATI Plain—1942
Tool & Cutter—#2 CINCINNATI—mtrized headstock
Universal—#1 BROWN & SHARPE—Excellent—1942
Universal—12"x36" NORTON Type C—Hydraulic—1941
Universal—12"x36" BROWN & SHARPE #2—Belt Drive

LATHES, ENGINE & PRODUCTION

10"x3' LOGAN #200—Bench—NEW
12"x30" CLAUSING Bench—mtr. drive—1942
14"x30" LODGE & SHIPLEY 12 speed-Geared Head—1942
14"x7' HENDEY—motor in base—taper att.
14"x6' HENDEY—geared head—QCG—mtr. driven
14"x8' MONARCH—QCG—Turner Mtr. Drive
14"x6' AMERICAN—geared head—QCG
16"x30" MONARCH CW—16 speed-Geared Head—1943
18"x8' LODGE & SHIPLEY—taper att.—Drive All mtr. drive
20"x54" REED PRENTICE—16 speed-Geared Head—1942
20"x5' WHITCOMB BLAISDELL—QCG—Belt Drive
PRODUCTION—13" LEBLOND Rapid—1943

TURRET LATHES AND HAND SCREW

#2 BROWN & SHARPE—Wire Feed—1942
#2 BROWN & SHARPE—Wire Feed—P. F. Turret—1941
#2G MOREY—P. F. Turret—1942
#3 WARNER & SWASEY—Universal—12 speed—air chuck—1942
#4 WARNER & SWASEY—Universal—Pre-selector—1942
#5 GISHOLT Universal—Pre-selector—air chuck—1943
#3R GISHOLT—Saddle type—Universal—Bar feed & chucking 1942

LEES-BRADNER #40 Automatic Chucking Production Thread Miller—Motor Driven

MILLING MACHINES

Hand—NICHOLS Rise & Fall spindle—1941
Horizontal—#2S VAN NORMAN—Plain—PRT—1943
Horizontal—#2K K&T "Milwaukee"—Plain—PRT—1942
Horizontal—#2 BROWN & SHARPE—Light type—Plain—1942
Horizontal—KEARNEY & TRECKER "Milwaukee"—#2HL—Plain—Vert. Hd.—1942
Horizontal—#3H K&T "Milwaukee" Plain—PRT—mtr. base—1941
Universal—VAN NORMAN—#22L—Swivel Head—PRT—1942
Universal—VAN NORMAN—#20—Swivel Head—all geared—mtr. driven
Universal—VAN NORMAN—#2—Swivel Head—Cullman Drive
Vertical—#7B FRAY Universal—B.G.—attach.—1943
Vertical—#2H K&T "Milwaukee"—P.F. to head—PRT—1943
Vertical—#2K K&T "Milwaukee"—P.F. to head—PRT—1942
Vertical—#2 CINCINNATI—H.S.—P.F. to head—1942
Vertical—#3H K&T "Milwaukee"—P.F. to head—PRT—1941

PRESSES

10-ton—#200 B PERKINS Inclinable—Mtr. Dr.—New
35-ton—#22 BLISS Inclinable—open belt
40-ton—#4 BLISS "Stiles" type—flywheel on back
45-ton—#4 ZEH & HAHNEMANN Inclinable
45-ton—#450B PERKINS Inclinable—Geared—Mtr. Dr.—New

PROFILERS

#12B PRATT & WHITNEY—2 spindle—1942
#13 PRATT & WHITNEY—1 spindle—gear drive

SCREW MACHINES — Automatic

#0 BROWN & SHARPE—Belt Drive—old style
#0G BROWN & SHARPE—High Speed—mtr. in base
#2G BROWN & SHARPE—High Speed—Auto.
#3¼—Model L—GRIDLEY—Sgle. Spindle—lg. asst. tooling

SHAPERS

7" LOGAN—mtr. in base—NEW
16" OHIO B.G.—Crank
16" STOCKBRIDGE Type—Crank
16" GOULD & EBERHARDT—Universal
20" GOULD & EBERHARDT—Back Geared
24" GOULD & EBERHARDT—Back Geared

MISCELLANEOUS

Gear Cutter—72" REUSON—SPD
Hoop Flarer—HOLMES #20½
Superfinisher—FOSTER—mtr. driven
Welder—PIER 82-12—10 KVA Spot
Oil Separator—CURTIS—mtr. drive
Riveter—GRANT—floor type—mtr. driven

1—9/16" RA-6 NATIONAL ACME 6-spindle Automatic Screw machine—chip conveyor—large assortment tools, cams, parts and accessories—with threading and tapping attachment
2—1⅛" RA-6 NATIONAL ACME 6-spindle Automatic Screw machines—chip conveyor—large assortment tools, cams, parts and accessories—one machine with threading and tapping
Both late type and design—Excellent condition—May be seen in operation.

UNITED MACHINERY & TOOL CORP.

NEW LOCATION

88 Central Street **Worcester, Massachusetts**

UNITED MACHINERY AND TOOL CORPORATION — UMTC

EASTERN REBUILT MACHINE TOOLS CONFORM TO MANUFACTURERS' STANDARDS OF ACCURACY

TURRET LATHES AND SCREW MACHINES

No. 1H6 Libby, m.d., chucking, latest
No. 1 Cincinnati-Acme Semi-Universal, m.d., chucking, Timken
No. 1L Gisholt Universal, m.d., chucking, Timken
No. 1A, 2A, 3A Warner & Swasey Universal, bar and chucking types
No. 2A, 3A Warner & Swasey Universal, chucking, Timken
No. 1A Warner & Swasey Universal, chucking, pre-selector head, latest
No. 2 Cincinnati Acme Full Universal, m.d., chucking, latest
No. 2B Foster Universal, m.d., chucking
No. 2G Morey, bar, m.d., latest
No. 2L Gisholt, m.d., chucking, standard and long bed types, Timken
No. 3 Cincinnati Acme Full Universal, m.d., chucking
No. 3 Foster Geared Head, m.d., bar
No. 3L Gisholt, m.d., chucking, Timken
No. 3L Gisholt, with cross sliding turret
No. 3B Foster Universal, m.d., bar
No. 3 Warner & Swasey Universal, m.d., bar, latest
No. 3 Warner & Swasey Universal, m.d., chucking, latest
No. 3A Warner & Swasey Universal, m.d., chucking, latest
No. 4R Cincinnati Acme, m.d., bar
No. 4 Gisholt Universal, m.d., chucking, Timken
No. 4 Warner & Swasey Plain, cone, bar and chucking types
No. 4 Warner & Swasey Universal, bar, m.d.
No. 4 Warner & Swasey Universal, bar, m.d., pre-selector head, latest
No. 4 Warner & Swasey Universal, chucking, as above
No. 4A Warner & Swasey Universal, m.d., chucking, latest type
No. 4A Warner & Swasey Universal, m.d., chucking, Timken
No. 5 Bardons & Oliver Universal Ram Type, m.d., chucking, pre-selector head, latest
No. 5 Foster Universal Geared Head, m.d., chucking
No. 5 Warner & Swasey Universal, m.d., chucking, Timken
No. 7 Bardons & Oliver Universal, m.d., chucking, late
2½" Jones & Lamson Universal Saddle Type, m.d., bar, latest
2½x24", 3x36", 3½x32", 4x34" Jones & Lamson Geared Head, m.d., bar and chucking types
3¼" Cincinnati Acme Geared Head Flat Turret, chucking and bar types
18" Libby Type A, m.d., chucking
24", 28" Gisholt, cone
26" Libby Type C, m.d., chucking

SAWS

P43 Kalamazoo Metal Cutting Band Saw, m.d.
Wells Type 8M Metal Band Saw, m.d.
6x6" Peerless Hack Saw, m.d.
5" Newton Cold Saw
7½ H.P. Cincinnati Elec. Tool Co. Abrasive Cut-off Machine, type JCAW
DeWalt Model ME 1 Abrasive Cut-off Machine, m.d.
No. 3 and 8 Nutter & Barnes Cold Saws
No. 6 Cochran-Bly Cold Saw
Gustav Wagner Cold Saw, m.d.
No. 138 Espen-Lucas Cold Saw, m.d.

RADIAL DRILLS

3'-10" Morris, m.d., gear box, inclosed head
3' American Sensitive, cone
4'-13" American Triple Purpose, gear box, inclosed head
4' American Sensitive, m.d. on arm
4'-12" Fosdick, gear box
4' Niles-Bement-Pond Semi-Universal, m.d.
5' American Triple Geared, 13" col., gear box
5'-15" American Triple Purpose, gear box m.d.
5'-13" Cincinnati-Bickford, m.d.
5' Cincinnati-Bickford Full Universal, gear box
5' Cincinnati-Bickford Plate Hole Driller, m.d. on arm
5' Prentice Plain, m.d.
6'-15" Carlton, gear box, inclosed head
6'-15" Cincinnati-Bickford, with 7' arm, m.d.
6' Niles-Bement-Pond Semi-Universal, m.d.
6'-16" Western, m.d.
7'-17" Dreses, gear box m.d.
8'-16" American Triple Purpose, m.d. on arm
8'-19" American Triple Purpose, m.d. on arm, 1942 Machine
10'-22" American Triple Purpose, m.d. on arm

8 New No. 73 Heald Airplane Cylinder Grinders

UPRIGHT DRILLS

20" Barnes All Geared, m.d., tapper
21" Cincinnati-Bickford, m.d., tapper
21" Fosdick, m.d., tapper
24" Cincinnati-Bickford. belt, tapper
30" Rich H.D., m.d.
H3 Barnes Hydram, m.d.
D4 Colburn H.D., m.d.
D8 Colburn H.D., m.d.
No. 25 Foote-Burt, m.d.
No. 36HO Baker H.D., m.d.
No. 217 Baker H.D., s.p.d.

GEAR SHAPERS

No. 6, 61, 645 Fellows, belt
No. 7, 7A Fellows, m.d.
No. 18 Fellows Gear Finishing Machine, m.d.
No. 61A Fellows, m.d., latest type
No. 64-S Fellows, m.d.
No. 65A3 Fellows, m.d., latest
No. 615A Fellows, m.d., latest
No. 645A3 Fellows, m.d., latest

INTERNAL GRINDERS

No. 16A—16" Bryant, m.d., latest
No. 16—22" Bryant, m.d., latest
No. 16Rs Bryant, m.d., latest
No. 16—38" Bryant, m.d., latest
No. 6, 10, 20 Bryant, belt
No. 24—21" Bryant, m.d., late
No. 24—36 Bryant, m.d., latest
No. 49 Heald Single End Borematic, m.d.
No. 70 Heald, belt
No. 72A Heald Plain, m.d.
No. 72A3 Heald Sizematic, m.d.
No. 72A3 Heald Gagematic, m.d.
No. 72A5 Heald Sizematic, m.d.
No. 72A5 Heald Plain, m.d.
No. 72A5 Heald Plain, long bed type, m.d., latest
No. 73 Heald Airplane Cylinder, m.d., brand new, latest
No. 74 Heald, m.d.
No. 172 Heald Gap, m.d., brand new, latest type
No. 649—16 Van Norman Automatic Oscillating Radius, m.d., latest

SURFACE GRINDERS

No. 3 Abrasive, m.d.
No. 10 Blanchard Rotary, m.d.
No. 11 Blanchard Rotary, m.d., latest
No. 16 Blanchard, m.d., 26" chuck
No. 22—12" Heald Rotary, m.d.
No. 25A—16" Heald Rotary, m.d., latest
No. 25A—24" Heald Rotary, m.d., latest
No. 33 Abrasive Vertical, m.d.
No. 260—16" Heald Rotary, m.d.
10x12x60" Norton Hydraulic Surface, m.d., latest
14" Pratt & Whitney Vertical, m.d.
18x60" Thompson Hydraulic, m.d., late
22" Pratt & Whitney Vertical, m.d.
24x28x144" Thompson Hydraulic, m.d., latest
54" Bridgeport Knife, belt

THREAD GRINDERS

No. 33 Excello Precision, m.d., latest
No. 39A Excello Internal Thread, m.d., latest

TOOL & CUTTER GRINDERS

Sterling Tool & Cutter, m.d.
No. 12M Grand Rapids Tap, m.d.
No. 2B Sellers Drill, m.d.
No. 3 Gallmeyer & Livingston, m.d.
Cincinnati Monoset, m.d.
Gleason Cutter, m.d.
No. 4T Sellers Tool, m.d., latest
No. 51 Oliver Drill, m.d.

BROACHING MACHINES

No. 4 Oil Gear Hydraulic, m.d., 64" stroke
No. 4 LaPointe of Hudson, gear box
No. 75 H.P. LaPointe Horizontal Hydraulic, 150" stroke, 37½ tons cap.
Cincinnati Mill Broach, m.d., 10" spindle, new

BALL BEARING DRILLS

2 spindle 21" Canedy-Otto, m.d., No. 4 Taper
Walker-Turner Bench Type, m.d.
No. ½, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d., new
No. 5M—16" Fosdick, m.d.
2 spindle No. 3 Avey, belted m.d., p.f.
3 spindle No. ½ Heavy Avey, direct m.d., latest
4 spindle No. 2 Avey, belted m.d.
6 spindle Leland & Gifford, No. 2, m.d. on spindle
6 spindle No. 2B Edlund, m.d., No. 2 Taper
6 spindle Henry & Wright Class B, m.d., No. 2 Taper

HORIZONTAL DRILLS

No. 1½B Pratt & Whitney 2 spindle Rifling Machine, m.d., latest
No. 410—2 spindle Barnes Deep Hole Drill, m.d.
No. 6 Barnes 2 spindle Honing Machine, 16' travel, m.d., latest
No. ½Bx30" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d.
No. ½Bx50" Pratt & Whitney Deep Hole Drill, m.d., latest
No. ½Bx50" Pratt & Whitney 6 spindle Reaming Machine, m.d., latest
No. 1B-50" Pratt & Whitney 2 spindle Deep Hole Drill, m.d., latest
No. 1 Pratt & Whitney 2 spdl Deep Hole Drill, m.d.
No. 1½x105" Pratt & Whitney 2 spindle Deep Hole Drill, m.d., latest
No. 1½ Pratt & Whitney 2 spindle, m.d., older type
Pratt & Whitney Rifling Machine, belt
5 spindle Detroit Semi-Automatic Drill, belt

MULTIPLE SPINDLE DRILLS

No. 3 Baush, m.d., 16x30" head, 15 spindles
No. 3 Baush, m.d., 20x40" head, 15 spindles
P7 Baush Hydraulic, m.d., 20x30" head, 12 spindles
D13H Natco Hydraulic, m.d., 18x12" head, 10 spindles
No. 16 Fixed Center Foote-Burt, m.d.
3 spindle 24" Barnes All Geared Self-Oiling, m.d.
3 spindle 12" Rockford Gang, m.d.
4 spindle Foote-Burt Rail, No. 4 Taper, m.d.
4 spindle Niles-Bement-Pond H.D. Rail, m.d., 12' Rail, No. 5 Taper

We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Visitors welcome at all times.

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS **EMCO**

EMERMAN OFFERS FROM STOCK

FAY AUTOMATICS — Late Type

- 24" x 42"
- 20" x 25"
- 20" x 55"
- 14" x 19"

Complete with Electrical Equipment

ALSO—8" x 60" LoSwing — 8" x 108 LoSwing
10" SUNDSTRAND AUTO. LATHES
6" SUNDSTRAND BRAKE DRUM LATHE

EMERMAN MACHINERY CORP. 875 W. 120th ST. CHICAGO 43, ILL.

HEADLINERS

LATHES

12"x5' SEBASTIAN Model R Grd Hd., new 1947
14"x6' AMERICAN 12-speed Grd Hd, AC MIB, taper
16"x34" ctrs AMERICAN "Pacemaker", taper, chucks, collets, (1943)
20"x8' LODGE & SHIPLEY Selec Grd Hd, AC MIB, taper
22"x10' ROCKFORD 3 SCD DBG bowl hd
24"x14' BOYE & EMMES, Turner Drive
24"x14' LODGE & SHIPLEY, Turner Drive, Taper
30"x16' LODGE & SHIPLEY, Lima Drive, taper

MILLERS

#2 CINCINNATI H.P. Rect. O/A Plain, AC MIB, PRT, Timken
#2B MILWAUKEE Plain, AC MD, DOA
#2B MILWAUKEE Univ., AC MD, DOA
#2M CINCINNATI Plain, AC MIB, Timken, #50 spindle
#3 CINCINNATI Dial Type Plain, High Speed (1943)
#4 CINCINNATI H.P. Univ., Lima Drive, div hd, vert hd, slot attach
#4B BROWN & SHARPE Plain, AC MIB, DOA, #50 spindle
6"x84" PRATT & WHITNEY Thread
#4—48" CINCINNATI Rise & Fall Hydromatic

SHAPERS & PLANERS

14", 24", 28", 32" GOULD & EBERHARDT High Duty
28" AMERICAN H.D., AC MD
30"x30"x8' CINCINNATI, AC MD
36"x36"x16' GRAY, AC MD, 4 hds

DRILLS

#1 AVEY 4-spdle, 7½" OH AC MD
#2 COLBURN Mfg.
#3 AVEY, AC MD, 12" OH
21" & 24" CINCINNATI-BICKFORD slid hd
24" CINCINNATI-BICKFORD "Super Service" (1943)

RADIAL DRILLS

2' & 3' AMERICAN Trip Grd, S.P.D.
3' CINCINNATI-BICKFORD, AC MD thru gear-box
3'-9" MORRIS "Mor-Speeed", full univ. table (1944)
4' MORRIS, MD
6' CINCINNATI-BICKFORD mtr on arm
7' DRESES, 17" col., AC MD thru gearbox

GRINDERS

8"x18" CINCINNATI Saddle Type Cyl., AC MD
#24—53" GARDNER Tub Type Vert Spdl Disc, AC MD
#2 CINCINNATI Tool & Cuter, complete (1944)
#3 CINCINNATI Centerless, new 1943

BORING MILLS

#3A UNIVERSAL Horz. 3" bar, SPD
#43 LUCAS Horiz., AC MD, 4½ bar, 20' betw faceplate & outer support
36" BULLARD "New Era" Vert. Turret Lathe, AC MD

GEAR MACHINERY

#1 ADAMS Hobber, AC MD
#18H GOULD & EBERHARDT Hobber, AC MD
#34 BROWN & SHARPE Hobber, AC MD
#61 FELLOWS Shapers
#6—60" BROWN & SHARPE Cutter

TURRET LATHES

#2B FOSTER Univ. Grd Hd, SPD
#4-W CINCINNATI ACME Univ., AC MD, thread chasing
#2-L GISHOLT, "Preselecter", bar feed (1943)

MISCELLANEOUS

#4 WATERBURY-FARRELL Thread Roller, AC MD
2½" LANDIS Double Head Bolt Threader, AC MD
10" PRATT & WHITNEY Vert. Shaper
INGERSOLL-RAND XB2 Air Compressor, 888 cu. ft., AC MD

YOUR INQUIRIES SOLICITED

COX MACHINERY CO.,
P. O. Box 1953 CINCINNATI 1, OHIO
OFFICE AND WAREHOUSE: 311-313 Bakewell St. Covington, Kentucky
Three minutes from the Cincinnati hotel district.

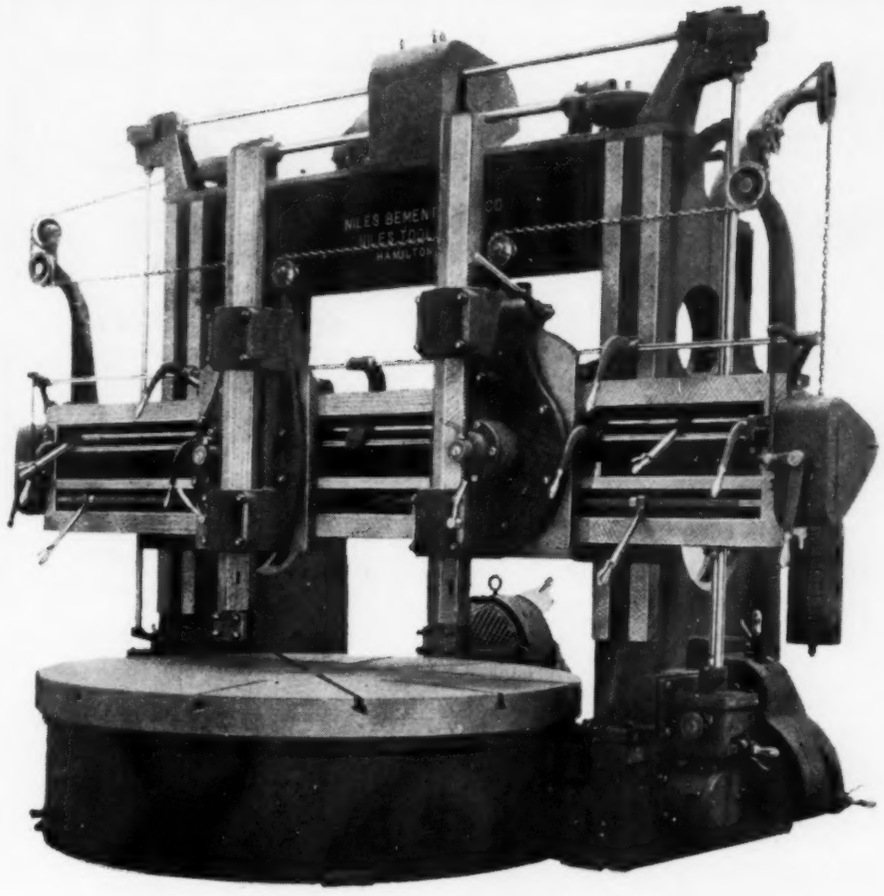
NEW SURPLUS

HIGH SPEED TOOL BITS

3/16"	square x 2"	long	$.05 each
¼"	square x 2½"	long	.10 each
5/16"	square x 2½"	long	.15 each
⅜"	square x 3"	long	.20 each
7/16"	square x 3½"	long	.35 each
½"	square x 4"	long	.50 each
⅝"	square x 4½"	long	.75 each
¾"	square x 5"	long	1.00 each
⅞"	square x 6"	long	1.25 each
1"	square x 7"	long	1.50 each

VICTOR MACHINERY EXCHANGE, Inc.
251 CENTRE STREET
NEW YORK 13, N. Y.
CANAL 6-5575

LATEST TYPE NEARLY NEW MACHINES



NILES BEMENT POND 84" and 100" Vertical Boring and Turning Mill, 2 Swivel Heads on Cross Rail, Power Rapid Traverse, AC/DC Motor Drive

BROWN & SHARPE #2G Automatic Screw Machine, High Speed, Latest

CINCINNATI 1-30, 3-30 Duplex Vert. Hydro Broach, Model E.R. Latest

CINCINNATI #2, #3 Centerless Grinder "Filmatic," Latest Type

CINCINNATI #2, 3, 4 Vertical Miller, Dial Type, Timken, Latest

CLEARING Type DS-1125-32 Double Action Eccentric Press, 125 Ton Capacity, Tie Rod, Latest Type

DETRICK & HARVEY 48x48x16' "HYDRAULIC" Planer, 4 Heads, M.D.

FELLOWS #61, 615A, 7, 7A, 72, 77 High Speed Gear Shaper, Latest

GISHOLT #3, #4 Universal Turret Lathe, Latest Type

GLEASON #17 Hypoid Spiral Bevel and Zerol Gear Grinder, Latest Type

GOSS & DeLEEUW 8" Automatic Chucker, 5 spindle, work rotating, Latest Type

HEALD No. 25A Rotary Surface Grinder—16" and 30" chuck, Hyd., Latest

HEALD 70A, 72A3, 72A5, 74, 81 Internal Grinder—Plain and Sizematic, Latest Type

JONES & LAMSON #3, #5, #8A Universal Turret Lathe, Latest Type

KING 52", 62" Vertical Boring Mill, 2 Swivel Heads, Motor Drive

LEES BRADNER Model HT 12"x24" centers Thread Miller, Latest Type

LANDIS 4"x18" Type H Plain Cylindrical Grinder, Hyd. Infeed, Latest

LUCAS #41 3" Bar Horizontal Boring Mill, Latest Type

MATTISON 14x24x72 Hydraulic Surface Grinder, Latest Type

MONARCH 12"x30", 12"x54" Centers Toolroom Lathe, Latest Type

NORTON 10"x36" Type C Plain Cylindrical Grinder, Hydr., Latest

REED PRENTICE #5 Vertical Miller and Die Sinker, Latest Type

SMITH & MILLS 16" Heavy Duty High Speed Shaper, Latest Type

UNIVERSAL 3" Bar Horizontal Boring Mill, Latest Type

WARNER & SWASEY #2A Universal Turret Lathe, Latest Type (Preselector)

Available for prompt shipment—Nearly all built since 1941. This is a partial listing. . . .

More than 2,000 Machine Tools in stock. We solicit your inquiries.

MOREY MACHINERY CO., INC.
410 BROOME ST., NEW YORK 13, N. Y.
TELEPHONE: CANAL 6-5360
CABLE ADDRESS: WOODWORK, N. Y.

THE "LIKE NEW" PERFORMANCE WITH CMCO REBUILT TOOLS

BUFFERS
Used 5 HP U. S. Electrical Tool Buffers
Used 15 HP U. S. Electrical Tool Buffers

DRILLS—RADIAL
5'-15" Column Carlton Radial Drill
2'-6' Plain Radial Drills
7' American
7' Cincinnati Bickford, gr. box
4' American Triple Purpose
4' Carlton, gear box
6' American Triple Purpose
5' Fondick Plain, Gear Box
No. 2 Avey—3 spdle. late type

GRINDERS—PLAIN
#12 Brown & Sharpe Plain Grinder
10"x24" Landis C Hyd. Univer. Grinder
No. 2 Landis Univ. belt drive
10"x24" Norton, Type BA, M.D.
16"x72" Landis, belt drive
18"x72" Cincinnati, latest type
20"x240" Landis, M.D.

GRINDERS—TOOL & CUTTER
#51—510 Oliver tool grinders
#13 Brown & Sharpe Cutter Grinding Machine
3" Cincinnati Tool & Cutter Gr. New 1942

GRINDERS—SURFACE
6"x18" Thompson Hydr. Surface grinder
14"x18"x72" G & L Model A Hyd surface grinder
12"x48" Cincinnati Grinder

LATHES
#6 LeBlond Multi-cut
10" Rivett Bench Type
14"x5' Lodge & Shipley Belt dr.
14"x6' Handy Yoke Hd.
14"x6' LeBlond Gr. Hd.
14"x6' Lodge & Shipley cone belt dr.
16"x6' American Belt drive
16"x14' South Bend loose eh belt dr.
18"x6' Boye & Emmes Belt drive
18"x9' L & S Bowl hd.
19"x8' Sidney Lathe Bowl Type
20"x4' Centers Bradford Lima dr.

LATHES (Cont.)
20"x10' Lodge & Shipley Belt dr.
24"x12' American 8 Sp. Gr. Hd.
24"x22' Lodge & Shipley Gr. Hd.
25"x12' LeBlond Gr. Hd.
30"x12' LeBlond Belt dr.
30"x26' American Geared Head
36"x12' Centers American Gr. Head
36"x36' American Geared Head

TURRET LATHES
2A Warner & Swasey Universal Turret
2L Gisholt Turret Lathe
3L Gisholt Turret Lathe
#4 Millholand
2¼x24" J & L Flat turret
3½x32" J & L Flat turret

MILLING MACHINES
Sundstrand 00 Hydraulic
3-24 Cincinnati Miller pl. Hydro.
1-8 Kent Owens Hydr.
#118 Van Norman Production Millers
28" Cincinnati Semi-Automatic
New Burke Hand Millers
1½ BS Double overarm miller
#21 B & S Plain
3S Cincinnati Plain
2S—B & S motor in base

SPECIAL
SQUARING SHEAR
10 ft. OHL, underdrive, cap. 3/16".

PLANERS
30"x30"x20" Gray Planers
42"x42"x20" Cincinnati Planer
72"x72"x20" Niles Bement Pond
42"x42"x20" Cincinnati Hypo

SHAPERS
14" Steptoe Belt Dr.
15" Smith & Mills
20" G & E Shapers
20" Ohio Belt Dr.
24" Cincinnati Belt dr.
24" Potter & Johnson

GUARANTEED MACHINERY

Cincinnati Machinery Co., Inc.
219 East Second Street
Cincinnati 2, Ohio

AUTOMATICS
No. 0G Brown & Sharpe
8" Bullard Multaumatic
⅝" Acme Gridley R6
1⅝" New Britain No. 61
1⅞" Conomatic 8 spindle
14"x19" & 16"x33" Fay
1¼" Cleveland 4 spindle

BORING MACHINERY
2½", No. 25T Giddings & Lewis
3" bar Universal horizontal
3¾" bar No. 32 Lucas horizontal
4" bar, No. 42 Lucas horizontal
4½" bar No. 33 Lucas horizontal
100" Niles-Bement-Pond, heavy pattern
53" Niles Bement Pond

DRILLS
21" & 24" Cincinnati upright
Nos. 121, 217, 314 & 315 Baker heavy
6', 15" Cint. Bickford radial
24", 6 spindle Foote Burt sensitive
4' Hammond Elbow Arm Radials
B4A—24 spindle Natco
24", 4 spindle Allen & Demco
12", 4 spindle Avey No. ½
15", 3 spindle Avey Type MA6

GEAR MACHINERY
8H, 12H & 16HS Gould & Eberhardt
Nos. 3 & 12 Barber Colman
No. 4 Cimatool Rounders
No. 130 Cleveland Rigidhobber

GRINDERS, CYLINDRICAL
6"x18" Norton, Landis, & Brown & Sharpe
Nos. 1, 2, & 13 Brown & Sharpe Universal
10"x18", 10"x30", & 10"x50" Norton mechanical
10"x18" Landis Type C, Hyd.
10"x24" & 16"x72" Landis Mechanical
14"x36" Landis Type C, Hyd.
16"x36" Landis Type D, Semi-Auto. Hyd.

GRINDERS, SURFACE
16" No. 10 Blanchard Rotary
30" No. 16 Blanchard Rotary
12" & 16" No. 22 Heald Rotary
16" & 24" No. 25A Heald Rotary
8" Pratt & Whitney Rotary
12" Walker rotary
10"x24" Norton Hydraulic
12"x48" Thompson Hydraulic
14"x60" Mattison Hydraulic
14"x40" Pratt & Whitney Vertical
8"x24" Abrasive No. 34 Vertical
24"x48" Springfield Planer Type

LATHES ENGINE
14"x6' Lodge & Shipley
14"x8' American
15"x6' Porter McLeod
16"x30" centers Monarch
20"x8' Lodge & Shipley
36"x16' Bridgeford

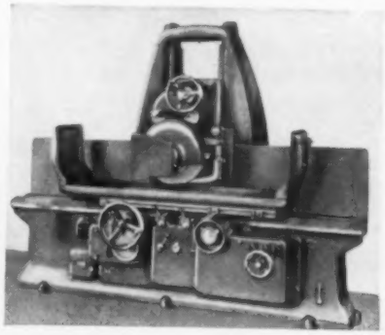
LATHES TURRET
24" & 42" Bullard
Nos. 4, 1L & 3AL Gisholt
Nos. 3, 4, 5, 1A & 3A Warner & Swasey
No. 3 Jones & Lamson
No. 2F Foster Fastermatic

MILLING MACHINES
Nos. 2H, 3H, & 4H Kearney & Trecker Vertical
Nos. 2, 3, & 4 Cincinnati Vertical
Nos. 1, 1M & 2 Kent Owens Hand
Nos. 1-12, 2-18, & 2-24 Cincinnati Automatic
Nos. 2-18 & 2-24 Cincinnati Rise & Fall Automatic
Nos. 3-24, 4-36, 5-48, 34-336, 56-72, & 56-90 Cincinnati Hydromatic
Nos. M-18, M-24 & 12-24 Kearney & Trecker

PRESSES
Nos. P1, P2, P3, P4 & P5 Ferracute punching
Nos. 10, 73½, 75½, 304 & 307 Bliss S.S.
No. 1½ Bliss cam drawing
1000 ton French Oil hydraulic
No. 2316½ Hamilton Coiner, 600 ton

MILES MACHINERY CO.
SAGINAW, MICH.

FOR SALE LIKE NEW



MATTISON—14"x16"x60"—
HIGH POWER HYD. SURFACE GRINDER

CAPITOL MACHINERY CORP.
253 Centre St. New York 13, N. Y.

MACHINERY FOR SALE

- 1—22'x48" Monarch heavy duty lathe good as new
- 1—Lodge & Shipley duomatic lathe
- 1—Gould & Eberhardt 36B rougher
- 1—D.E. Whiton #16 gear cutter
- Potter & Johnston #5 DE machines

SIER-BATH GEAR & PUMP CO., Inc.
9252 Hudson Boulevard
North Bergen, New Jersey

PRACTICALLY NEW OZALID WHITE PRINT MACHINE
Type B, Serial No. 6431, 3 Ph., 60 Cy., 220 Volts. Actual usage less than six months.
PRICE $1,000.00
WINSTON MACHINERY CO., INC.
517 South Delaware St., Indianapolis 4, Indiana

MODERN
used and rebuilt
MACHINE TOOLS

PARTIAL LIST OF MACHINES NOW IN STOCK

AUTOMATICS
Bullard Mult-Au-Matic, 6 spdl. Model D. 1941.
6″ Conomatic, 4 spindle. 1943.
6″ Goss & DeLeeuw Chucker, 8 spdl. 1943.
2½″ Cleveland, Model A. 1944.
1⅝″ Greenlee, 6 spindle. 1942.
9/16″ & 1″ RA 6 Acme Gridley. 1943.

BORING MACHINES
No. 40 Universal "Triway", 4″ bar. Late.
No. 49 Heald "Bore-Matic." 1942.
No. 47A Heald "Bore-Matic." 1942.
No. 2112A Excello. 1943.

DRILLS, RADIAL
4′ 11″ Carlton. 1943.
3′ 9″ Cincinnati Bickford. 1943.
3′ 9″ Dresses. Late.

DRILLS, UPRIGHT
No. 36 HO Baker. 1942.
No. H3 Barnes Vert. Hydram. 1942.
25″ Fosdick Economax. 1941.
24″ Sibley Sliding Head. 1942.
No. 3 Bausch Multiple Spindle.
Fox Multiple Spindle. 1944.
Barnes 2 Spindle Deep Hole. 1943.

DRILLS, SENSITIVE
No. KH2 Allen, 6 Spindle. 1943.
No. 2 MS Allen, 1 to 3 spindle. 1942.
No. 2 Motor-Avey, 3 spindle. 1942.
No. 2B-8 Edlund, single spindle. 1942.
No. 2 Hamilton-Muehlmot. 1943.
Leland-Gifford, single spindle. 1942.

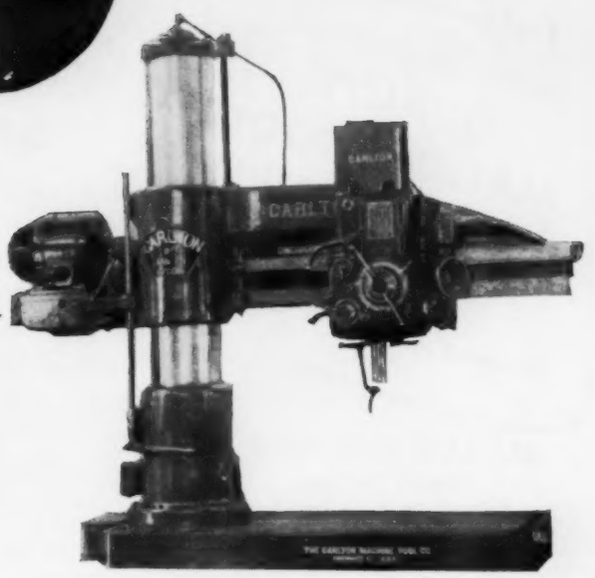
GEAR CUTTERS
No. 5 AC Lees Bradner Gear Gen. 1941.
No. 7A & 715 Fellows Gear Shaper. 1942.
Model 615A Fellows Gear Shaper. 1944.
Model GCL-3 Red Ring Gear Shaver. 1942.
Type S Barber Colman Hobber. 1942.

GRINDERS, CYLINDRICAL
14″ x 36″ Norton Type C Universal. 1943.
10″ x 48″ Norton Type C Plain. 1941.
10″ x 36″ Landis Type C Plain. 1944.
10″ x 24″ Landis Type C Universal. 1942.
10″ x 18″ Norton Type C Plain. 1942.
6″ x 18″ Landis Type C Plain. 1941.
4″ x 12″ Landis Type H Plain. 1942.
No. 2 & 3 Cincinnati Centerless. 1942.

GRINDERS, INTERNAL
No. 74 Heald Extended Bridge. 1941.
No. 75A Heald, two motor. 1943.
No. 72A3 Heald Plain. 1942.
No. 72A5 Heald Plain. 1944.
No. 16 CP-16″ Bryant. 1942.
No. 104 Rivett. 1942.

GRINDERS, SURFACE
16″ x 16″ x 48″ Thompson, Type C. 1943.
12″ x 12″ x 40″ Thompson, Type B. 1942.
No. 3B Abrasive. 1942.
No. 2B Reid. 1944.
No. 25A Heald Rotary. 1942.
No. 22 Heald Rotary. 1943.

GRINDERS, TOOL & CUTTER
No. 2 Cincinnati Univ. 1941.
No. 22 Covel Universal. 1942.
No. 4T Sellers Carbide Tool. Late.
Barber Colman Combination. 1943.
No. 44, 48 and 49 Excello. 1942.



6′ 17″ CARLTON RADIAL DRILL, with motor on arm, enclosed head, 96 spindle speeds (10 to 1250 RPM), 18 feeds (.004″ to .125″) #6 morse taper, electric clamping device, box table, DC motors and controls. New 1942.

LATHES, ENGINE
20″ x 48″ Lodge & Shipley. 1941.
18″ x 54″ Lodge & Shipley. 1943.
18″ x 54″ Sidney. 1943.
18″ x 48″ Bradford. 1942.
16″ x 8′ South Bend c.d. 1944.
14″ x 78″ Reed Prentice. 1942.
14″ x 54″ Reed Prentice. 1942.
14″ x 30″ Hendey. 1939.
14″ x 30″ Lodge & Shipley. 1943.

LATHES, PRODUCTION
14″ x 42″ Monarch "Magna-Matic." 1941.
9″ x 20″ Lipe. 1942.
8″ x 36″ Lo-Swing Semi-Auto. 1942.
8″ x 21″ Fay Automatic. 1942.
8″ x 15″ Sundstrand, Model 8. 1942.
Model 1MP & R Lo-Swing.

LATHES, TURRET
No. 3A Warner & Swasey. 1943.
No. 2A Warner & Swasey. 1942.
No. 9A Jones & Lamson. 1942.
No. 1 Acme Universal. 1941.
No. 3L Gisholt. Late.
No. 2L Gisholt.
No. 5 Warner & Swasey. 1941.
No. 4 Warner & Swasey. 1941.
No. 3 Warner & Swasey. 1943.
No. 2 Warner & Swasey. 1941.
No. 2, 3 & 7 Bardons & Oliver. 1941.
No. 3 & 4 Gisholt. 1943.

MILLING MACHINES, PRODUCTION
No. 34-36 Cincinnati "Hydromatic." 1942.
No. 3-36 Cincinnati "Hydromatic." 1943.
No. M-24 Milwaukee "Simplex." 1942.
No. 1248 Milwaukee "Simplex." 1942.
No. 08 Cincinnati, Rise & Fall. 1942.
No. 2-18 Cincinnati, Rise & Fall. 1942.
No. 1-18 Cincinnati. 1942.
No. 12 Brown & Sharpe. 1942.
No. 1-14 Kent Owens. 1943.
No. MM-1-6 U.S. Multi-Miller. 1942.
No. 00 & 2 Sundstrand. 1943.

MILLING MACHINES, PLAIN
No. 3B Brown & Sharpe. 1941.
No. 3 Kempsmith-Maxmiller.
No. 2H Milwaukee. Late.
No. 2M Cincinnati.
No. 2B Brown & Sharpe.
No. 1 Brown & Sharpe.
Van Norman Hand Mill.

MILLING MACHINES, UNIVERSAL
No. 2A Brown & Sharpe. Late.
No. 2M Cincinnati.
No. 2MH Cincinnati. 1942.
No. 2H Milwaukee. 1942.

MILLING MACHINES, VERTICAL
No. 2 Milwaukee, Model D. 1945.
No. 3H Milwaukee. 1940.
No. 2K Milwaukee. 1942.
No. 2 Cincinnati. 1940.
No. 2 Milwaukee.
No. 40-H Index.

MISCELLANEOUS
No. CPC 6-30 LaPointe Vert. Broach. 1941.
50KVA Federal Spot Welder. 1942.
No. 616 Cleveland Rigidturner.
No. 26F Norton "Hydrolap." 1942.
No. 74 Excello Center Lapping Mach. 1942.
No. 1 Savage Nibbling Machine.
5 HP Clark Buffer.
100 Ton Hannepin Hydraulic Press. 1942.
No. 45 Reliance Punch Press. 1945.
No. 8-6 Zeh & Hannemann Punch Press. 1942.
No. 14½ Williams & White Single End Punch.
No. 3C Hendley & Whittemore Punch & Shear.
Type D Langlier Swaging Machine. 1941.
8′ Leland Gifford Radial Tapper. 1941.
No. 1 Savage Roller Type Nibbler. New.
No. G824 Parker Tube Bender.

PLANERS & SHAPERS
52″ x 36″ x 40′ Cincinnati Planer.
42″ x 42″ x 20′ Cincinnati Planer.
36″ x 36″ x 16′ Ohio Planer.
28″ Smith & Mills Shaper.
16″ Gould & Eberhardt Shaper.
6″ Pratt & Whitney Vertical Shaper.

SAWS
14″ x 20″ Racine "Shear Cut." 1942.
13″ x 13″ Peerless Universal. 1943.
11″ x 11″ Peerless "Hydra Cut." 1945.

ALL MACHINES MAY BE INSPECTED UNDER POWER IN OUR WAREHOUSES

Indianapolis
MACHINERY & SUPPLY CO., INC.
1961 South Meridian Street, Indianapolis 6, Indiana
Telephone: GArfield 4421

HIGH QUALITY NEW, USED AND REBUILT MACHINE TOOLS

EXPORT OFFICE:
44 Whitehall Street, New York City

MEXICAN OFFICE AND WAREHOUSE:
Hidalgo Oriente 2-535-B, Mexico, D. F.

Cut Costly Production Delays with Botwinik's

QUALITY MACHINE TOOLS USED AND REBUILT

Ready for Immediate Delivery

ALL LATE TYPE TOOLS

TURRET LATHES

Warner & Swasey #4 & #5 Pre-Selector Head Universal—holes thru spdls 2-7/16" and 2⅞"—swing 18½" and 20"—bar or chucking.

Jones & Lamson #5 Ram Type Universal—hole thru spdl 3"—swing 21¼"—max. dist. turret to spdl nose 30"—spdl spds 20 to 1000.

4—Bardons & Oliver #3 Universal—swing 15⅜"—hole thru spdle 1⅞——swing 15⅜"—max dist turret face to spdl 24"—spdl speeds 1,015 RPM and 1525 RPM.

Cincinnati-Acme #6 Universal—hole thru spdl 3" —swing 20¼"—max turret to spdl nose 30"—spdl speeds 30 to 600.

GRINDERS

Mattison 14"x24"x60" High Power Hydraulic Precision Surface Grinder—complete with mag. chuck & extra grinding wheels.

Pratt & Whitney 14"x60", Type M-1640 Vertical Spindle Hydraulic Surface Grinder, MD 30 HP on spindle, segment chuck wheel—complete with 14"x 60" mag. chuck, (equal to new machine).

Blanchard #11 High Power Rotary Surface Grinder —16" dia. mag. chuck--range 20" dia. x 8" high.

Cin. #2 Centerless Grinder—Filmatic bearing—serial 2M2H1K-1144.

VERTICAL MILLERS

Reed-Prentice #4 Improved Hydraulic Vertical Milling Machine (1942 vintage) complete with Detroit duplicating atchmt—Tbl Wkg Surf 70"x24", range long 48", cross slide travel 24", vertical travel head 12"—top of Tbl to Spdl Nose max. 24", min. 12"—power rapid traverse—#50 Taper—18 Spdl Spds 30 to 1200 RPM—weight 18,000 lbs.

Milwaukee #2K Vertical Miller—Rotary Table—Range long 28", cross 12", vertical 14"—spdl spds 15 to 1500 RPM.

Only a Partial Listing of our huge stock. Write, Wire or Phone.

Botwinik Brothers
OF MASS., INC.
3 SHERMAN ST. WORCESTER 1, MASS

Roller Type Scalping Machine 22" Slab Capacity
#1A W&S Turrt Lathes Bar Feeds
Libby 26" Turret Lathe, 4½" Hollow Spindle
#33 ExCello Ext. Thread Grinders
Norton Ext. Plain Grinder 24"x36"
Landis #3 Universal Cyl Grinder 16"x48"
Lees Bradner CT 36" Thread Millers
B&S #4, 36" Gear Cutters
Fellows 615 Gear Shaper
Farnham Forming Roll 12'
Onsrud Router Model A-4-RR 84"
#2B—4 sp. Edlund Drill 16"x52" Table
#2 Cincinnati Milling Machine, Plain
#3 LeBlond Plain Milling Machine

CONTINENTAL SALVAGE & MACHINERY CORPORATION
1836 EUCLID AVENUE, CLEVELAND 15, OHIO
MAIN 4402

REYNOLDS
OF PROVIDENCE
USED MACHINERY BARGAINS

#5BM FOSDICK SINGLE SPINDLE DRILL 220/440-3-60, late type $1100.00

#5 BARDONS & OLIVER HAND TURRET LATHE 220/440-3-60, serial #11889 ..... $3500.00

#0-G BROWN & SHARPE AUTOMATIC SCREW MACHINE, high speed, serial #7695, motor in base $1900.00

#2 BROWN & SHARPE VERTICAL MILLER, motor in base, excellent condition $3500.00

REYNOLDS
MACHINERY COMPANY
305 Eddy Street
Providence 3, R. I.
Telephone JAckson 8900

UNUSUAL VALUES

Milling Machines—No. 1, Universal, No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—26" Gould & Eberhardt 42".

Grinders—Cylindrical B & S No. 11, Planer type 16"x36", Surface 13"x63", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x6', 8', 10—16"x6', 8', 10'—18"6', 8', 10'—26"16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized
Large stock 19" and 18" bench and floor type.

Planers—Single head 24"x6', 24"x8', 26"x8'.

Shapers—16", 20", 24", B.G. crank.

Turret Lathes—J & L 2"x24"—3'x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 40".

SPECIAL—New totally enclosed dust proof, fan cooled, ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt No. 25 24" Hi Duty 3" capacity in steel, motor attached.

PATTERN MAKING MACHINERY—42"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.
P. O. Box 88, Columbus 16, Ohio

BARGAINS!
SURPLUS EQUIPMENT

AJAX 1½", 3½", Upsetter, M.D.
BRIDGEFORD 36x24' Centers Engine Lathe, M.D.
BULLARD 16" 6 and 8 spindle Mult-aumatic Type D Single Indexing, New 1943
CINCINNATI #3, #4 Vertical Milling Machine, Geared Motor Drive
CINCINNATI #3 Centerless Grinder, M.D.
CRANES from 5 to 30 ton capacity all 230 volts, DC current
FRANKLIN 4¼" Bar Horizontal Boring Mill Table Type Motor Drive
JONES & LAMSON "Fay" 20x25 Centers Production Lathe, New 1941
LoSWING 8x108" Centers Production Lathe, New 1941

NIAGARA 1000, 1200 KVA Transformers, New 1941

NILES 30x50' Bed Boring Lathe, New 1941
NILES 72x63' Centers, Combination Boring and Turning Lathe, Motor Drive
PUTNAM 42"x25' Centers Engine Lathe, M.D.
SUNDSTRAND #3A Duplex Miller — 40" feed, New 1941
VAN NORMAN #3 Duplex Universal Miller

CINCINNATI No. 4 Plain Milling Machine, Geared, Timken Bearing
KEARNEY & TRECKER No. 4 Plain Milling Machine, Geared, Timken Bearing
WARNER & SWASEY #5 Universal Turret Lathe, Timken Bearing

This is a partial listing.

HARRISON MACHINERY EXCHANGE, INC.
South 4th St. Harrison, N. J.
10 minutes from New York City—5 minutes from Newark, N. J.
Tel.: HUMBOLDT 2-5750, 2-5775

PRESSES

375 ton Elmes, 12" stroke, 84x54 bed, late type
350 ton Elmes, 20" stroke, 36x45 bed, late type
250 & 750 Baldwin, 144x48 bed, 40" stroke
#408A Bliss Dbl. Action Toggle, 72x54 Bed, w/cushions, mtrs., controls.
#305 Bliss, 8" stroke, late, w/air cushions.
60 ton, Dbl. Crank, 5" stroke, 48x24 bed, late model Waterbury Farrel (3).
2300 ton Bliss Hydr., 3 col. type, 12" str., 42'
#56 Toledo 4" stroke, 21x21 bed, 15½" shut height.
35 ton, 4, 5, 6" stroke, latest type, pract. new, w/all accessories, Bliss $850.00 ea.
70-85 ton 4" stroke, 21x27 bed, 110 strokes per min., Bliss, latest type.
90-125 ton 4½" or 5" stroke, 60, 80, 110 (optional) strokes per min., late Type.
Inclinable, new, 20 to 70 ton, immed. dely.

AUTOMATICS, LATEST TYPE

#0G B & S, late type
1" New Brit. Grd., 6 spdl
1⅜" R4—New Brit. Grid.
1½" & 1⅝" Cone—8 spdl. late
9/16", 1", 1¼", 1⅜", 2", RA6 Acme Grid.
2¼" & 2⅝" Cone 6 Spdl.
16" 8 spdl. Bullard Multaumatics, pract. new, (3) with some tooling, dbl. & sgl. index
12" 8 spdl. Bullards, late type, lots of tooling.

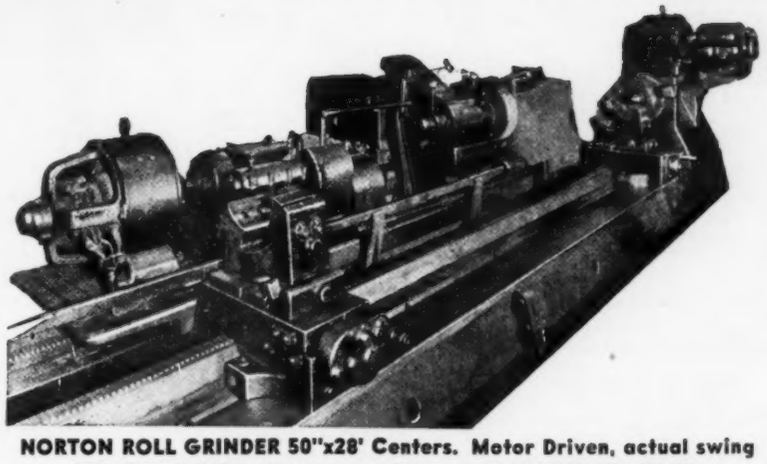
PAUL'S MACHINERY COMPANY
MONA MEMBER
6111 Vermont Avenue
Detroit 8, Michigan
TYLER 7-6300

FOR SALE
Brand New BARNES No. 224-B
Single Spindle Honing Machine
—never off original skids—
THE BROWN MACHINE TOOL CORP.
3 Woodside St. Stamford, Conn.
PHONE 4-6025

SCARCE LATE TYPES

Acme-Gridley RB6 2⅝", 6 spindle, threading & drilling, NEW 1944
B & S 00G Automatics (3)
Van Norman #12, Slotter
Van Norman #26, #36 ram type Mills
Canedy-Otto 3'9" cal. Radial
NBP 2500 lb. Single Frame Steam Hammer
Ferracute D.D.G. 56, 100 ton Double Action Cam Press
Universal 3" boring mill
Gorton Duplicators and Vert. Millers, 8D, 9J
Gorton 3U, 3L, 3Z, ME, Engravers
Marvel No. 6, 6A auto-Hacksaw
Landis #6 Thread Grinder
Hanson-Whitney Thread Miller
Thompson 6 x 18" Hyd. Surf. Grinder, Type C & F, Atlantic
Abrasive 6 x 18, 6 x 24 Surface Grinders No. 3B, 34, 1½
Conomatic 1⅞" 8 spindle
Brown & Sharpe #5 Cyl. Grinder
Tannewitz Band Saw #36M
Thompson Sciaky Seam, Spot Welder
Mod. 26 Rafter, New 1945
W & S Nos. 3, 4 Grd. Hd. Preselector
Gisholt No. 4, 5, Univ. Turrets
Acme #6W M.D., Foster 3B
Oliver 20' Woodworking Planer
Oster 60I Rapiduction, Tooling
Hardinge ESM, 2nd operation
Cincinnati 12x36" Univ. Grinder
No. 18, 25 and 35 Gallmeyer and Livingston Hyd. Surface Grinders, 6x18, 8x24
#25A Heald, M.D., Rotary Surf.
Cinn. #2 Centerless Grinders Filmatic
B & S No. 2, 2B Surface, M.D.
Norton 6x18" Hyd. Surface, M.D.
Covel #91A Tool, & Cutter
Hammond & Excello Carbide Grind
Gardner #226 Disc Grinder
Monarch 10"x20" Lathe, Mod. EE
Hendey 12x30, G. H. Lathes
Mercy No. 3 Univ. Turret Lathe
South Bend, M.D. 9x3½", 10x48' 13"x5'
Sebastian 12x4' grd. hd., Sheldon
Rivett No. 918 bench, M.D.
Hardinge, Elnin Cabinet Lathe
Lodge & Shipley 16"x78" 12 speed
Buffalo #0 Angle Roll, Excelsior
Bliss #58, OB Gap Presses 62, 62A, 162
Burke Miller Pl. & Univ.
Nichols Hand Miller, Vert. Hd.
Delta Single & Multiple Drills
Oliver Heavy die Filer, 510 Drill Pointer, Sellers 40
Taylor Winfield 50 KVA Spot Welder
Peerless No. 226, Eyeletting
HI Speed Hammers, all sizes
Cinn. #3 Pl., #4 Vert. Dial Type Rect. Arm, Mills
B. & S. #12 Elec. Prod. #008
Waterbury-Farrell #30 Thread Roller & Dies, 1943
Cinn. Bickford 24" Super Serv.
V & O 102 Reducing Press
V & O, Z & H 25, 35 Ton OBI
Cinn. 1-12, 2-18 Production Mills
Stokes Tablet Presses
Ball & Jewel Plastic Grinders
20"x30' Boye & Emmes Grd. Hd., Lathe
Onsrud Router W240
Micromatic Hydrohoner HI
Walker-Turner Bench Drills, ½"
Porter-Cable 68 Belt Sander
LeBlond 19"x12 sc. Lathe, Removable Gap
Wilder Optical Comparator
Black Diamond Drill Grinder
Cinn. & Schauer Speed Lathes
Cleveland #1 Vertical Miller
Clark Hardness Tester
Bakewell #1, Ultromat Tappers
Federal #5 OBI Press
Gen. Flexible Elec. Screw Press
Davis #4 Keyseater
Chicago (D.&K.) 334 Brake
Clearing 90 10 Press Brake
Excelsior 21", Buffalo 15" Drills
Kent Owens IV Prod. Mills
Pratt & Whitney Radius Grinders
DoAll ML Band Saw
Bridgeport Vertical Miller & Slotter
Large lots of Cinn. & Milw. vert. hds. div. hds., Vises, Arbors, Hartford Super spacer, etc.

AARON VALUES IN MODERN TOOLS



NORTON ROLL GRINDER 50"x28' Centers. Motor Driven, actual swing 54". Bed divisible into two sections. *IMMEDIATE DELIVERY.*

NEW IN STOCK

Power Foot & Gap Shears—30" to 96"

Spot & Arc Welders, 6x6" Racine Hacksaw
4, 5, 7, 10, 12, 18, & 30 ton OBI Power Presses
Ammco 7", Shape Rite 8", Shapers
H.S. Vertical Milling Heads
Drill Presses, Foot Presses, Air Hydraulics
Kalamazoo Metal Band Saws
No. 1½ Abrasive Wet Surface Grinder
20 ton Northern Hydraulic Presses
10Z & 20Z Injection Moulders
Famco 6C Arbor Presses—½ Price—Presses
Sheldon 12" B.G. Shaper

TURRET LATHES

Foster Nos. 4, 5, 6, 1B, 3B, M.D. Univ.
J. & L. 2"x24", 3"x36", W & S #4, 2A

GRINDERS

Surface Grinders, 6x18, 8x24, Abrasive, G. & L.
P. & W. 14", B.B., Vert. Surface 19"x40"
Blanchard 30", M.D.; Modern 12x48" M.D.
Norton Hydraulic 12x18", M.D. Cyl.
Heald No. 72A3 Gagematic
Norton 50"x28' M.D. Roll Grinder
Landis Type A 6x20" Hydraulic, M.D. Cyl
No. 55, 60, 65 Heald Int., M.D.
12" Heald Rotary, Arter 12" M.D.
B. & S. No. 10, 11, Cyl.: 1, 3 Univ.

LATHES

26x12' Boye & Emmes 3 step cone D.B.G.
14"x6' Hendey Taper, Collets 16"x8'
9" LeBlond, P&W 1"x18" Automatic
36x30' Putnam M.D., 36x22', 42x16
32"x35' Wickes, M.D.
Wade, Hjerth, Hardinge, P & W Precision Bench

AUTOMATICS

Cleveland Model A ⅞", 1¼", 2"; B 1", 2", ⅞"
Cone 4 spindle, Gridley
Brown & Sharpe #4, 6 Auto., #2 Hand Screw

MISCELLANEOUS

Buffalo 25UD Comb. Punch-Shear
Pexto 3' to 8' Shears & Brakes
Gorton 1A: 375-2 Tool & Cutter Grinders
Wiedman Turret Punch—Type R4P
6" Vertical Shaper, P & W
10x10 Peerless Universal Shaping Saw
#7, 72 Fellows Gear Shapers

HYDRAULIC EQUIPMENT

500 TON LAKE ERIE PRESS

Platen 35"x38", 36" stroke, 68" opening, 150 H.P., 220-440 V. Motor.
600 Ton Baldwin South. Platens 76"x59, Stroke 22", Opening 36".
500 Ton H.P.M. Double Action with 160 ton cushion. Platen 36"x36", Stroke 24", Opening 36".
375 Ton ELMES Double Action, with 60 ton cushion. Platen 84"x44", 12" Stroke, 42" Opening.

350 TON VERSON PRESS

40x40 Platen, 36" stroke, 72" opening. 100 H.P. 3 phase—60 cycle 440 volt.

400 & 500 TON SHAFT STRAIGHTENERS, Self Contained

All Hydraulic equipment is completely engineered and checked by a competent staff, thus assuring reliability. Send us your hydraulic problems.

Deckel G1, G2, G1F Engraving machine
Leland-Gifford 1, 2 & 4 spindles, Model MS
Geo Ohl 8' 16 Gage M.D. Shear, 12' 10 Ga. Brake
Oster No. 316B 6" Pipe Threader, M.D.
Bliss 30" Gang Slitter, 19, 20, 21 OBI Presses

MILLING MACHINES

3B K. & T. Dbl. Overarm
Cleveland Vert. No. 1 M.D.; #1 Univ.
#2B K. & T. Univ.; No. 2, 2A B & S Univ.
No. 3S Cincinnati, S.P.D. rapid trav.
Nos 1½, 2, 5 B & S Plain & Univ.
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 2, 3, 4 Cincinnati Vert., S.P.D.
P. & W. No. 12, 1 & 2 spind. Profiler
B & S. No. 1, 3 Vert., Kempsmith No. 1, 2
Taylor-Fenn Spline Miller

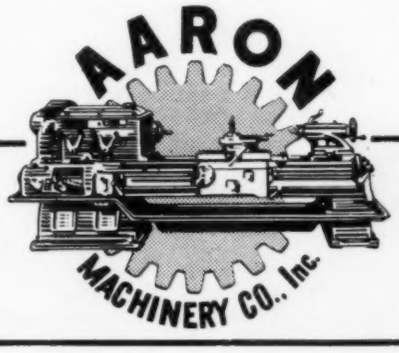
RADIALS

Carlton 8' Arm 19" col. M.D., 3½' Mueller
4', 5', 6' American Triple Purpose
Walker-Turner ½" cap., Cinn. Bick. 6'

BORING MILLS

#0 Giddings & Lewis arr. M.D. 3"
2½" Cleveland arr. M.D., 2½", 4" Binsee
Niles-Bement-Pond 4- duplex, 66" Niles
Bullard New Era 24", 42", King 42"

WRITE FOR OUR FREE ILLUSTRATED CATALOG



AARON MACHINERY CO., Inc.

45 Crosby Street
WOrth 4-8233

New York 12, N. Y.
Cable: AARMACH, N. Y.

MBNA

STOP

Trying to get top production out of old machines. Let NOLL'S rebuilt and guaranteed machines do your job.

LATHES & TURRET LATHES

No. 5 Gisholt (Chucker)
No. 4 Gisholt (Chucker)
16x54 Bradford Lathe
16x36 Reed Prentice
46" Rogers
84"x24' New Haven
36"x24' Fiefield

GRINDERS

Norton, type C, 10x36 Ang.
Rivett, No. 104 Universal
Landis, 16x36 Universal
Landis, 6x18 Plain Hyd.
Heald, 72A3 Plain Int.
Norton, Type C, 16x36
No. 5 Bryant Chucking
Blount Wet Tool Grdr.
No. 2 Cincinnati Centerless
No. 11 Blanchard
No. 30 Blanchard
16x36 Diamond Surface Grinder

GEAR EQUIPMENT

2—No. 3 Gleason Spiral Bevel Gear Generators
2—Foster 4"x18" Hyper Finishers
120 HG & E Gear Hobber

DRILLS

Edlund 4 Spindle Drill Press
Allen 6 Spindle Drill Press
200—26" Defiance Drill
Leland-Gifford, 2 Spindle Power Feed
Edlund, 2 Spindle Power Feed
6'17" Cinci. Bickford Radial Drill

MILLS

No. 2 Brown & Sharpe Vert. Mill
9J Gorton Duplicator
M-18 K & T Production
No. 2-18 Cincinnati Prod.
2—24 Cinn. Climb Mill
2G Kempsmith

4-A WARNER & SWASEY

AUTOMATICS

2" RAS6 Acme-Gridley
Model 60 New Britain
2½ Cleveland Model A
14" Morey Vertical Shaper, Latest Type Machine

14" Morey Vertical Shaper, Latest Type Machine

MISCELLANEOUS

J & L Comparator
Gardner Polishing Lathe
No. 30 Fosdick Jig Borer
No. 5 Reed Prentice Jig Borer
No. 5 Toledo OBI
6" Betts Floor Type
6" Defiance Table Type
12"x54" Lees Bradner Thread Mill, CT
3 Ton Elwood Parker Boom
2—¼" Giddings & Lewis Boring Mill (table type)
1⅜" Cone Chucking Machine
Harding Vert. Milling Mach.
91 A Covell Univ. Tool & Cutter Grinder
14x60 Hill Acme Surf. Gr.
Cinn. Duplex Mill Mach.
100 Ton SS Ferracute Press

Noll EQUIPMENT CO. MDNA MEMBER
2476 E. 13th St. CLEVELAND 15, OHIO

Phone CHerry 1550

BENNETT SPECIALS

36" Bullard Mill, Spiral Dr., 4 jaw
6" bar Ingersoll Floor Type Mill 6' vert. & 6' hor., new 1943
5" bar Sellers Table Type Mill, 48" spin. to table, 100" spin. to outer support, '42.
4" bar Universal Table Type Mill, 60" spin. to table, 96" spin. to outer support, '42.
3½" & 4" Landis Floor Type Mills
10"x48" Cinci. Grinder Plain, Late
48" x 19'6" centers Niles Heavy Lathe, Taper, new 1943
42"x84" centers Amer. Lathe, M.D.
36"x32' bed Niles Lathe, 2 carr., T.A.
20"x92" centers Hendey Lathe, T.A., collets
16"/18½"x54" cc Springfield Lathe, 1944
7' Carlton 17" col. Radial, 1943
Nos. 5, 4, 3 & 2 W. & S. Turrets, Late
#4 Gisholt Univ. Turret Lathe, 1942
36"x36"x12' Cinci. Hypro Planer, 4 Hds., Var. Voltage, 1943
24"x24"x16' Ingersoll Planer Type Miller, 4 hds., 20 H.P. AC, M.D.
4K K. & T. Miller, Hor. Dial
48" N.B.P. Slotter, Grd., Late
15'x¾" Wicks, Bending Rolls, M.D.
3" Bar Yoder Table Type, Hor. Mill

BENNETT MACHINERY CO.
30 Church St., New York 7, N. Y.

McDONALD USED MACHINERY

G & E 24" Cin. 32" Shapers
Cleveland O.S. Planer 36"x8', 2 hds.
Abrasive No. 34 M.D. Vert. Surf Grinder
Cincinnati D. H. Planer 36"x36"x10', 2 hds.
Monarch 20" grd. hd., M.D. Lathe 16 sp, Speeds Model "M"
Bullard Vert. Turret Lathes, 24" & 36" S. Head
Defiance 3" Horiz. Boring Mill & Univ. No. 3-A
L & S 18x12' & 20'x10', 20"x8' Grd. Hd., M.D. & 28"x12' Lathes Monarch Model "C"
American 24'x12 grd. hd. lathe, m.d. q.c.g.
American 4-ton vert. Hydr. Broach
Blanchard Vert. Surf. Grinder, 26 rd. chuck
Cincinnati No. 2 Centerless Grinder
Colburn 60" & 72" Vert. Boring Mills
Cincinnati 1-M grd. hd., Univ. tool room Miller.
Cincinnati No. 5 H.P. grd. hd, S.P.D. Pl, Miller.
W. & S. No. 2A grd. hd, Univ. Turret Lathe, S.P.D.
Foster No. 2F Ostermatic grd. hd. Turret Lathe, M.D.

MDNA MEMBER

McDONALD MACHINERY CO.
1531-35 No. B'way., St. Louis 6, Mo.

EXCEPTIONAL BUYS—CLEAN TOOLS

No. 4 W-S Turret, Bar feed, quantity of tooling 412,000 plus
6 spindle drill press (Demco) Late
P. W. Keller Machine Like New
Haskins and Bakewell Tappers Late
Lees Bradner Thread Miller (Cheap)
2-TR-59 Hardinge Lathes Late
Vernon Jig Borer Late
Model EE 10 Monarch Complete, Like New
#4 Cinn., Horizontal Mill Cheap
#5 B O Universal Turret Lathe Chucking (15373)

New Machinery in Stock

FERDINAND J. SNOW CO.
381 Broadway Westwood, N. J.
WEst. 5-1027

FOR SALE

Ready for Use

PLANER—36"x36"x12' Niles-Bement-Pond
BARNESDRIL—#307 Single Spindle Hydraulic Honing Machine

THE VIMALERT COMPANY, LTD.
JERSEY CITY 5, N. J. DELAWARE 3-6400

SHEET METAL MACHINERY

NEW and USED—Hand and Power Brakes, Shears, Forming Rolls, Folders, Punches, Rotary Machines, Stakes, Spot and Arc Welders

MDNA MEMBER

B. D. BROOKS, INC.
361 Atlantic Ave., Boston, Mass.

National Bent Shank Nut Tappers Battery of ⅝" to 1" Machines.
Waterbury-Farrel Fdry. ⅝" and 1" D.S. S.D. Cold Headers, also Thread Rollers.
Fisher 5" Bar, Floor Type Boring Mill. New in 1942.
Niles, Bement, Pond 60"x60"x24' table 4-Head Planer, Rev. D.C. M.D.
Bliss Presses in all sizes up to 1,000 ton capacity.
Wire Working Machinery.

National Machinery Exchange
128-138 Mott St., New York 13, N.Y.

AVAILABLE FOR IMMEDIATE DELIVERY

(1) **HILL-CLARKE (Norton) 10"x72" PLAIN CYLINDRICAL GRINDER** AC motor drive—Shipped new in August 1945—Used less than 25 hours—Priced at 50% of acquisition cost. **A real buy for quality shops. Wire or call collect**

R & H MACHINERY, INC.
84 Prescott St., Worcester 5, Massachusetts

POWER PRESSES

BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED

MDNA MEMBER

JOSEPH HYMAN & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

For more than 80 years

THE NAME "HILL-CLARKE MACHINERY" HAS MEANT THE BEST BUYS IN MACHINE TOOLS . . . . . .

AUTOMATICS

No. 2 Brown and Sharpe
1⅜" Greenlee, 6 Spdls (1941)
No. 61 New Britain 6 spindle 2¼"
No. 6 Brown & Sharpe

DRILLS

No. D-8 Colburn No. 6 Morse Taper
No. 150 Baker Mfg.
No. 1LMS 20"—6 Spdl. L.G.
No. 2LMS—26"—4 Spdl. L.G. (1942)
No. 2MA6—15"—4 Spdl. Avey
No. 3B—24"—6 Spdl. Edlund (1942)
No. 2—8 Spdl. Leland-Gifford
No. 4 BL Natco 36 Spdls.
7'-15" Col. American Full Universal

GEAR MACHINES

No. 7125 Fellows (1943)
No. 712 Fellows Auto Indexing (1943)
No. 72 Fellows Gear Shaper
No. 18-H Gould & Eberhardt
11" Gleason Bevel Gear Cutter
72" Cincinnati Gear Cutter
No. 13 Gleason Univ. Tester (1942)

HOR. BOR. MILLS

No. 26 Defiance, 4½" bar (1943)
No. 31 Lucas, 3" bar
No. 3A Universal, 3" bar
Rockford, 3⅛" bar

GRINDERS

4"x12" Landis, Model H (1942)
4"x18" Landis Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x18" Norton Type C Plain (1943)
10"-14"x36" Norton Type C Plain (1942)
Norton Motor Driven Plain Grinders
6"x18" —— to —— 24"x240"

12"x36" Landis Type LCH Universal (1945)

No. 5—8"x24" Covel Hydr. Surf. (1941)
24"x24"x84" Mattison Hydr. Surf.
No. 34 Abrasive Surface (1943)
No. 22—12" Heald Rotary Surface
No. 25A—24" Heald Rotary Surface (1943)

72A-3 Heald Internal Grinder (1942)
72A-5 Heald Internal Grinder (1942)
74 Heald Internal Gdr. (1942)
No. 5 Bryant Internal Grinder (1942)
No. 16-16 Bryant Internal Gdr. (1942)
No. 16-38 Bryant Internal Grinder (1942)
No. 24-26 Bryant Internal Grinder (1942)

10"x72" Colonial Broach Grinder

LATHES

14"x6' Hendey, Yoke Head
15"x5' Sebastian, Grd. Head
16"x54" centers LeBlond (1941)
18"x6' American, Grd. Head
22"x48" centers Monarch (1942)
36"x30' Lodge & Shipley
36'—48"x16' Lehman Hydrotrol (1945)
48"x20' centers Simmons (1942)
50"x17' centers LeBlond (1942)

LATHES (Production)

8"x15" Sundstrand, Model D (1943)
10"x22" Sundstrand, Model AA (1943)
12"x18" Lipe Carbo (1942)
16"x33" Fay Automatic (1942)
20"x25" Fay Automatics (1942)

MILLING MACHINES

No. 4 Cincinnati Plain (1943)
No. 08 Cincinnati Vert. (1942)
No. 2H Milwaukee Vert. (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Cincinnati Vert. High Power
24" Cincinnati Production
No. 1-18 Cinn. Mfg. (1940)
No. 2—18" Sundstrand Electromil (1942)
No. M-18 Milwaukee Simplex (1942)
No. M-24 Milwaukee Simplex (1942)
38"x40"x10' Fitchburg Duplex Miller (1943)
No. 4-48 Cinn. Hyd. Tracer (1942)
No. 45-48 Cinn. Hyd. Plain Tracer (1942)
No. 56-90 Cinn. Hydromatic (1943)
No. 2 Hanson-Whitney Thread
4"x9" Hanson-Whitney Univ. Thrd. Miller
4½"x12" Pratt & Whitney, Model C
6"x20" Pratt & Whitney, Model C
6"x36" Lees-Bradner—Model HT (1943)
6"x48" Pratt & Whitney Thrd. Miller
6"x80" Pratt & Whitney Thread
6"x132" Pratt & Whitney Thread Miller
6"x168" Pratt & Whitney Thread
10"x48" Hanson-Whitney Thread Miller (1942)
4" Taylor & Fenn Spline, M.D.
24"x24"x12' Ingersoll Adj. Rail
36"x36"x16' Ingersoll Slab Miller
72"x6' Ingersoll Face Miller (1941)

MISCELLANEOUS

18" Dill Slotter
Model H-7 Micromatic Hydro Honer
Model H-705 Micromatic Hydro Honer
Model H-2 Micromatic Hydro Honer
Model 200 Micromatic Hydro Honer
No. 22-C Racine Shear Cut Hack Saw
8-M Wells Band Saw
No. 20 Bliss O.B.I. press
No. 2 V & O open back press
No. 0 Bakewell Tapper
Baush Radial Tapper (1942)

PLANERS

36" x 36" x 12' Cincinnati
36" x 36" x 18' Gray, 4 Heads
48" x 36" x 14' Gray
48" x 48" x 12' Cincinnati, 4 Heads

TURRET LATHES

No. 2 B. & S. Screw Machine, Wire Feed
No. 3 Bardons & Oliver (1942)
No. 5 Warner & Swaseys (1942)
No. 5 Bardons & Olivers (1942)
No. 5 Foster, A.C. & Bar Feed (1942)
No. 2-A Warner & Swasey
No. 1-H Libby, 6¼ Hole in Spindle (1937)
No. 1-H Libby, Extra Long Bed (1942)
18" Libby, 3½" Hole in Spindle
No. 4A Warner & Swasey, 7½" Hole in Spindle

VERT. BOR. MILLS

34" King
36" Rogers, side hd. (1942)
72" Cincinnati
72" Niles Extra Heavy
84" Betts

HILL-CLARKE MACHINERY CO.
651 WASHINGTON BLVD.
Chicago 6, Ill.

ADVERTISED PRICES ON PRACTICALLY NEW MACHINES

(6) CLEVELAND RIGIDTURNERS MODEL No. 616. Original Cost $7,000.00. Excellent Condition. PRICE....$2,000.00 ea.

(1) POTTER & JOHNSTON #5D2 AUTOMATIC CHUCKING MACHINE. Two Spindle, Mfg. in 1942. Excellent Condition. Serial No. 52913. PRICE $4,850.00

(1) #2-L GISHOLT TURRET LATHE, SERIAL NO. 666-17. With Cross Sliding Turret, 3 Jaw Chuck. PRICE.....$4,350.00

(1) 200 Ton HYDRAULIC STRAIGHTENING PRESS. Mfg. by Hydraulic Press Co., Length of Bed 240", Width 24", Clearance Between Rods 30". PRICE $4,500.00

(2) 2-25 TON BLISS DUPLEX PRESSES. PRICE .....$850.00 ea.

(1) NO. 33 EXCELLO THREAD GRINDER. Serial No. 4714, Mfg. in 1943. Excellent Condition. PRICE.....$3,000.00

(1) JONES & LAMSON MODEL NO. TG615 AUTOMATIC THREAD GRINDER. Serial No. 130156. Excellent Condition. PRICE $2,750.00

(1) NO. 75-A HEALD INTERNAL GRINDER. Serial No. 22065. Excellent Condition. PRICE $2,250.00

(2) NO. 72A-5 HEALD INTERNAL GRINDERS. Serial Nos. 13939 and 13940. Excellent Condition. PRICE..$1,500.00 ea.

(2) NO. 74 HEALD INTERNAL GRINDERS. Serial Nos. 24602 and 24603. Excellent Condition. PRICE.....$2,250.00 ea.

(1) LANDIS 18 x 18 EXTERNAL GRINDER. Excellent Condition. PRICE $2,500.00

(4) PRATT & WHITNEY 9" GEAR GRINDERS. PRICE.....$1,000.00 ea.

(4) DETROIT GEAR GRINDERS, Model GG-19. PRICE.....$1,150.00 ea.

(1) TURCHAN FOLLOWER FOR BULLARD BORING MILL. PRICE.....$1,000.00

(1) GLEASON 15" QUENCHING PRESS. Excellent Condition. PRICE.....$1,250.00

(1) GISHOLT NO. 4-R SADDLE TYPE TUR-

(4) #2-G BROWN & SHARPE Automatic Screw Machines. Excellent Condition. PRICE $4,000.00

MONA MEMBER

WINSTON MACHINERY COMPANY, Inc.

517-23 SOUTH DELAWARE STREET, INDIANAPOLIS 4, IND.

1—300 Ton Caldwell Horizontal Wheel Press

1—Niles Bement Pond Wheel Lathe. Will turn up to 42" Wheels.

Write or Wire for Details

Frank M. Judge & Company, Inc.

7010 Empire State Bldg.

New York 1, N. Y.

FOR SALE

CINCINNATI 48"x48"x12' Openside Planer with individual meter drive
No. 4 WARNER & SWASEY Ram Type Turret Lathe with individual meter drive

Both machines in good condition.

GALLMEYER & LIVINGSTON CO.

GRAND RAPIDS, MICHIGAN

FOR SALE

Froude Water Dynamometer
Model DPX6 Rated Capacity
1200 H.P. @ 1200 R.P.M.

JOSEPH HAAG

347 E. FOURTH ST., WILLIAMSPORT 18, PA.

FOR SALE

Verson 500 ton twin geared S.S. 42"x42" bolster, 8" stroke M.D. Press. Complete with 75 ton air cushion. Can be inspected under power.

Write for full information.

BOTWINIK BROTHERS, INC.

NEW HAVEN, CONNECTICUT

ALL LATE TYPE TOOLS

16" x 54" LeBLOND Heavy Duty Lathe, Taper attachment
No. 3 BARDONS & OLIVER Turret Lathe
No. 3 WARNER & SWASEY Turret Lathe
No. 3B BROWN & SHARPE Dial Type Plain Milling Machine
No. 4 CINCINNATI Plain Mill, Dial Type
No. 1224 KEARNEY & TRECKER Simplex
36" OHIO Extra Heavy Duty Shaper
No. 615A FELLOWS Gear Shaper
20"/24" GOULD & EBERHARDT Industrial Universal Shaper
6" x 18" CINCINNATI Cyl. Grinder
12" GLEASON Bevel Gear Generator

O'CONNELL MACHINERY CO.
1825 NIAGARA ST. BUFFALO 7, N.Y.

BEdford 8500

BROACH, Colonial 1036 Vertical Surface
DRILL, 5' American Triple Purp. Radial
DRILL, No. 14 Natco Multiple, M.D.
GEAR GENERATORS, 3" Gleason Straight Bevel, 1943 machines, M.D.
GEAR HOBBERS, No. 12-H & 24-H G & E, M.D.
GEAR HOBBER, Goss 36" Universal
GRINDERS, RADIUS, Van Norman Wide Angle Cont. Feed; Nos. 620, 639, 660, & 673
OIL PURIFIER, No. 600 DeLaval, M.D.
PRESS, No. 3A Bliss D.C., Tie Rod, SG
PRESS, No. 6D Bliss D.C., Tie Rod, DBG
PRESS, No. 1B Superspeed, 10 Ton H.S.
SAW, BAND, 36" Tannewitz, BB, M.D.
SHAPERS, 16" G & E High Duty, M.D.
TAPPER, No. 1 Bakewell

HOWARTH MACHINERY CO.

505 E. 9 Mile Road, Detroit 20, Mich.

Phone JOrdan 4-6490

---

this Searchlight Section of

AMERICAN MACHINIST

is an index of reliable sources for Used and Surplus Equipment Supplies now available. Consult the *Searchlight Section* in following issues for later offerings.

If you you don't see what you want—ask for it. Ask the advertisers. They are constantly adding to their stocks and may have acquired just what you need. Or, shall we ask them for you?

And, when you have special items to dispose of, use the Searchlight Section of American Machinist to help you locate buyers. . . . Send a list of your equipment and we will gladly give information as to space and rates.

Classified Advertising Division

AMERICAN MACHINIST

330 W. 42nd St., New York 18, N. Y.

WE ARE IN THE MARKET FOR YOUR SURPLUS METAL CUTTING TOOLS

DRILLS, TAPS, DIES, REAMERS, MILLING CUTTERS, HACKSAW BLADES AND FILES

SEND US YOUR LIST

DeWITT TOOL CO.

173 GRAND STREET NEW YORK CITY 13, N. Y.

WANTED: KEYSEATER

12" minimum stroke up to 1½" key width capacity, tilting top or attachments for keyseating taper bores.

MEMPHIS CASTING WORKS, INC.

P. O. Box 1622, Memphis, Tennessee

WANTED

(1) CINCINNATI #5 or #6, or MILWAUKEE 5H or 5K, or TYPE CS VERTICAL MILLER
Must have high range of spindle speeds
Wire or call collect

R & H MACHINERY, INC.

84 Prescott St., Worcester 5, Mass.

ENGINEERED REBUILT MACHINE TOOLS

BUILT MACHINE TOOLS ENGINEERED REBUILT

FOR HEAVY TOOLS..... SEE SIMMONS

PUNCHES & SHEARS

7/8"x7/8" with 36" throat
5/8"x5/8" with 42" throat
1¼"x1" with 48" throat
1½"x1" Double End
165-Ton Guillotine, 14" knives
No. 2 Canton Alligator
10'x1/16" Ohl Squaring
No. 215 Stoll Rotary
No. 7½ Cleveland Press

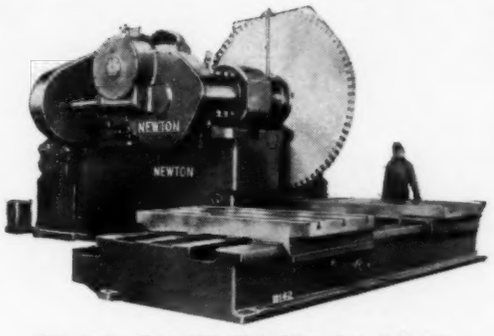
SAWS

60" Newton Cold Cut-Off
120" Newton Cold Cut-Off
9"x9" Peerless High Speed

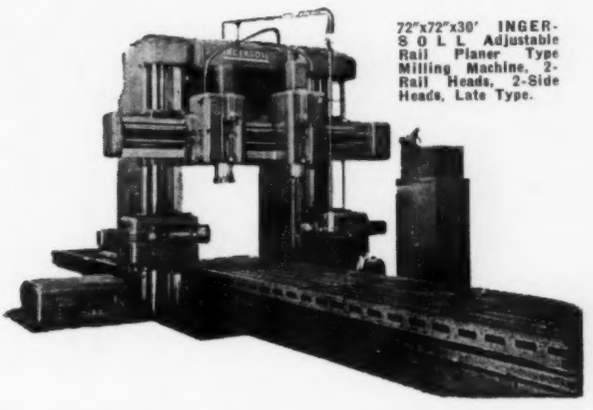
36"-44" NILES Vertical Turret Lathe, P.R.T., Turret and Side Head, AC or DC Motor Drive.

LATHES

18"x6' American, Geared Head
20"x8' American, Geared Head
24"x10' American, Geared Head
24"x12' American, Geared Head
30"x10' American, Geared Head
42"x18' American, Geared Head
42"x32' American, Geared Head
48"x18' American, Geared Head
30"x50' American Super Gun Boring & Turning



120" Newton Type "U" 97-A Heavy Duty Cold Saw with Hydraulic Screw Feed.



72"x72"x30' INGERSOLL Adjustable Rail Planer Type Milling Machine, 2-Rail Heads, 2-Side Heads, Late Type.

Write today for Complete Current Stock List of Simmons *Engineered-Rebuilt* Machine Tools.

SIMMONS MACHINE TOOL CORPORATION

MAIN OFFICE AND PLANT: 1759 N. BROADWAY, ALBANY 1, N. Y. NEW YORK OFFICE: 50 EAST 42ND STREET

ENGINEERED Machine Tool REBUILDING

GOOD MACHINES

36"x32' Niles Bement Pond Lathe, 2 carriages

25"x18' LeBlond G.H. Lathe

13"x30" Model "B" P&W Tool Room Lathes

#2 and #3 Warner & Swasey Turret Lathes

#12 and #22 Brown & Sharpe Production Millers

HAZARD BROWNELL
350 Waterman St., Providence 6, R.I.
DExter 8880

STOCK TOOLS — *Prompt Shipment*

BORING MILL, Hor. #0 G & L, 3" bar.
BORING MILL, Vert. 14' Niles, 2 Hds., M.D.
BORING MILL, 42" King, 2 Hds., M.D.
BORING MILL, 72" N-B-P, 2 hds., M.D.
BROACH, XA Oilgear, Hor., 60" Str.
DRILL, Radial 4½' Cincinnati-Bickford.
DRILL, Radial 5' Cincinnati-Bickford.
DRILL, Radial 6' American, Mtr. on Arm.
GEAR HOBBERS, 12-H Gould & Eberhardt
GRINDER, Broach, "E" Thompson, 6x48" Hyd.
GRINDER, Int., No. 72-A-5 Heald, Hydraulic.
GRINDERS, Surf. Nos. 3 & 5 Abrasives.
GRINDER, Surf. Rotary No. 25 Heald.
HAMMER, Pneumatic, Nos. 4-B & 6-B Nazel.
HAMMER, Steam Drop, 2000# Chambersburg.
LATHE, 9"x5' Hardinge, Prec., M.D.
LATHE, 14"x6' Hendey, Tie-Bar T.A., M.D.
HAMMER, St. Forging, 6000# Chambersburg.
LATHE, 14"x6' L & S, 12-Speed Grd. Hd.
LATHE, 22"x16' L & S, Q.C.G., T.A.
MILLERS, Pl. No. 3, 4, & 5 Cincinnati.
MILLER, Thread, No. 40 Lees-Bradner.
MILLER, Duplex, 24" Cincinnati.
MILLER, Univ., No. 4 Cincinnati.
PLANER, 30"x30"x8' Liberty, M.D.
PLANER, 72"x72"x20' N-B-P, 2 Hds., M.D.
PRESS, S.S., 250 Ton Chambersburg, Hyd.
SHAPERS, 24" and 32", M.D.
SHAPER PLANERS, Openside, 26" Farquhar.
SHEARS, 12' x 18 ga., 11' x 1½".
SHEAR, Sq. No. 372 Stoll, 72"x½".
UPSETTER, 4" National, M.D.

LANG MACHINERY COMPANY
28th St. & A.V.R.R. Pittsburgh, Pa.

"WALSH" PUNCH PRESSES

Size	Stroke	Delivery
6 Ton	1¼" or1½"	10 days
12 Ton	1½" or 2"	Immediate
18 Ton	2" x or 2½"	Immediate
20 Ton	2½" or 3"	Immediate
24 Ton	2" or 2½"	Immediate
28 Ton	2½" or 3"	Immediate
38 Ton	3", 3½" or 4"	Immediate
55 Ton	3" or 3½"	Immediate
65 Ton	4" or 4½"	Immediate

All Presses Complete with Drive, Motor, Counting and Safety Devices. Roll Feeds For All Presses. Two Weeks Delivery. Time Payments Arranged. Exclusive Distributors.

SCHULTZ & ANDERSON CO.
115 Edison Place, Newark, New Jersey
Tel. MArket 2-4318

No. 00G B & S High Speed Automatics
Monarch 27"x48" centers Lathe
No. 13 B & S Universal Grinder, M.D.

MDNA MEMBER

D. E. DONY MACHINERY CO.
47 Laurelton Road, Rochester 9, N.Y.

BUSINESS FOR SALE

Highly skilled mechanical business, in operation over 30 years, small personnel required. Modern plant costing approximately $200,000—Located Central Connecticut. At a bargain. Owner-manager too old.

BO-6765 AMERICAN MACHINIST
330 W. 42nd ST., NEW YORK 18, N. Y.

Bor. Mill, Hor. 3" G and L, MD.
Boring Mills, 24"-36"-42"-52"-72"-90"
Drills, Radial 3'-4'-5'-6' Cin.-Bick.
Lathe, Turret 3-A W and S, S.P.D.
Millers, Plain No. 3 K and T, No. 4 Cin.
Millers, Vertical No. 3 B and S and No. 4 Cin.
Shaper, 16"-20"-24"-36".
Shaper, 36" Morton Draw Cut.
Squaring Shear, Niagara 11'x10 gauge

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

MODERN MACHINES

Campbell Cut-Off #213, Hydraulic.
Drills, 4 & 5 Spdl. #2 MT, Ind. Motors.
Grinder, Centerless, #2 Cin. "Filmatic."
Grinder, Centerless, #3 Cin. "Filmatic" (new).
Grinder, Cutter & Tool, #2 Cin. Plain.
Grinder, Surface, 10x36" Norton Hyd.
Grinder, Thread, #39 Excello, 5-motors.
Lathes, So. Bend 10"x4' & 14½"x6'.
Millers, Auto. 0-8 and 1-18 Cin.
Miller, Production, #12 B. & S.
Profiler, 12-B. P. & W., Sgl. Spdl.

Partial List.

GALBREATH MACHINERY CO.
Empire Bldg., Pittsburgh, Pa.

PROFESSIONAL SERVICES

MACHINERY FOR SALE

Potter & Johnston 5 DE Machine
3 spindle Gould & Eberhardt 36B Rougher
16" D. E. Whiton Gear Cutter motorized & rebuilt by the manufacturer.
Lodge & Shipley Duomatic Lathe.

SIER-BATH GEAR PUMP & CO., INC.
9252 Hudson Boulevard, North Bergen, N. J.

WALTER C. REED
Consulting Engineer
(Formerly of General Electric Co.)
Brazing, Soldering Alloys & Fluxes
Metal Joining Methods
DALTON, MASS.

INDEX OF PRODUCTS ADVERTISED IN THIS ISSUE

Abrasives....18-19, 26-27, 42-43, 59, 199, 211, 245, 246, 262
Accessories & Attachments (Machine Tools)...57, 64, 159, 182, 189, 225, 227, 230, 254
Arbors & Mandrels 258
Bearings—4th Cover, 16, 139, 176, 204, 223
Books, Technical 172, 232, 244
Boring, Drilling & Milling Machines (Horizontal) 177, 231
Boring & Turning Machines (Vertical) 230
Broaching Machines.....68, 142, 155
Brushes 81, 175
Centers 207, 242
Chucks 180, 233, 246, 247, 248
Cleaning & Drying Machines & Supplies 193, 226, 239
Coolant Systems, Filters & Supplies...194, 206
Cut-Off Machines; Sawing Machines 153, 188, 228
Dressers, Grinding Wheel....164, 240, 260
Drilling Machines.....21, 41, 62, 76, 79, 83, 151, 157, 197, 219, 230, 236, 254, 258
Engineering & Production Services....243
Fabricating Methods & Services...163, 221
Fasteners.....189, 190, 203, 226, 249, 252
Gages & Instruments....34, 48, 186, 200, 246, 260, 262
Gear Cutting Machines.....6-7, 234
Gears, Speed Reducers, Motor Reducers..61, 73, 74, 230C, 234, 235, 246
Gear Testers .....3rd Cover
Grinders—Cutter & Tool.....3, 70, 212
Grinding Machines—Production....2nd Cover, 5, 12-13, 30, 33, 34, 46-47 50, 70, 186, 212, 224, 237, 241, 242
Heads: Drilling, Grinding & Tapping..252, 256
Heat Treating Equipment & Supplies..4, 173, 190, 258
Honing Machines 78
Jig Borers.....257, 261
Lathes, Automatic.....21, 31, 60, 77
Lathes, Engine.....3rd Cover, 21, 64, 67, 76, 80, 149, 159, 214, 226, 227, 258
Lathes, Turret 22-23, 51, 58, 77
Lubricants, Cutting Fluids, Quenching Oils, Rust Preventives.....88, 213, 216, 228, 239, 262, 265, 266
Lubricating Systems & Equipment....165
Materials, Cutting & Forming..49, 208, 236
Materials of Manufacture....14-15, 49, 144, 161, 163, 176, 179, 182, 195, 196, 223, 232, 255
Materials Handling Equipment.....192
Millers, Die Sinkers, Profilers..55, 76, 174, 185, 238, 253, 257, 258, 261
Parts & Equipment, Electrical.....69, 72, 201, 205, 251
Parts & Equipment, Hydraulic & Pneumatic 187, 210, 230D, 260
Parts & Equipment, Mechanical.....228
Planers 54, 66
Polishing & Buffing Machines.....252
Power Transmission.....73, 74, 82, 263
Presses, Forging & Forming Equipment & Supplies.....28-29, 32, 35, 36-37, 44-45 65, 75, 84, 90, 169, 171, 183, 188, 192, 198, 218, 226, 242, 244, 257, 260, 264
Riveting Machines 228
Safety Equipment 220
Screw Machines; Chucking Machines..17, 60, 71, 146, 257
Shapers, Slotters, Keyseaters...90, 254, 258
Shop Furniture 20
Special Machine Tools.....41, 256
Steel Blue 186
Tapping Attachments 258
Tapping Machines 258, 260
Textiles 181
Threading Machines 10-11, 264
Tooling Set-Up Equipment.....38, 257
Tools, Cutting....24-25, 39, 40, 52, 53, 56, 63, 68, 140, 142, 166, 168, 170, 178, 184, 202, 208, 209, 215, 217, 228, 240, 254, 256, 257, 259
Tools, Hand.....8-9, 37, 38, 52, 168, 217
Tools, Portable 8-9, 191
Transportation 250
Vibration Control 250
Welding & Cutting, Brazing & Soldering Equipment & Supplies...35, 36-37, 167, 183, 222

ADVERTISERS INDEX

	PAGE
Abbott Ball Co.	228
Aber Engineering Co.	215
Abrasive Machine Tool Co.	224
Acme Aluminum Alloys, Inc.	243
Air Reduction	222
Ajax Manufacturing Co.	218
Alemite	165
Allegheny Ludlum Steel Corp.	179
Allied Research Products Inc.	262
Allis-Chalmers Manufacturing Co.	72, 82
Almond Mfg. Co., T. R.	246
Aluminum Co. of America	14, 15
American Brass Co.	195, 196
American Broach & Machine Co.	68
American Gas Furnace Co.	173
American Nickeloid Co.	163
American Optical Co.	220
American Screw Co.	189
American Steel Foundries, King Machine Tool Division	67
American Swiss File & Tool Co.	168
American Tool Works Co.	21
Armco Steel Corp.	144
Armstrong-Blum Manufacturing Co.	56
Armstrong Brothers Tool Co.	38
Auto Engine Works Inc.	246
Automotive Gear Works, Inc.	230C
Avey Drilling Machine Co.	254
Baldwin Southwark Div., Baldwin Locomotive Works	44, 45
Barber-Colman Co.	63
Barnes Drill Co.	41
Bath & Co., John	240
Baumbach Manufacturing Co., E. A.	257
Baush Machine Tool Co.	197
Behr-Manning Corp.	199
Bemis & Call Co., Inc.	246
Bethlehem Steel Co.	49
Blanchard Machine Co.	50
Bliss Co., E. W.	32
Bodine Corp.	231
Bridgeport Machines, Inc.	55
Brown & Sharpe Mfg. Co.	46, 47
Bryant Chucking Grinder Co.	33, 34
Bryant Machinery & Engineering Co.	64
Buerk Tool Works	186
Buffalo Bolt Co.	249
Bullard Co.	22, 23
Bunting Brass & Bronze Co.	223
Carboloy Co., Inc.	240
Carborundum Co.	42, 43
Carlton Machine Tool Co.	258
Carpenter Steel Co.	236
Carroll & Jamieson Machine Tool Co.	226
Central Screw Co.	189
Century Electric Co.	251
Cincinnati Bickford Tool Co.	83
Cincinnati Gear Co.	234
Cincinnati Gilbert Machine Tool Co.	79
Cincinnati Grinders Incorporated	5
Cincinnati Milling Machine Co.	4
Cincinnati Planer Co.	54
Cincinnati Shaper Co.	90
Clearing Machine Corp.	171
Cleco Division of Reed Roller Bit Co.	191
Cleveland Crane & Engineering Co.	153
Colonial Broach Co.	155
Columbia Machinery & Engineering Corp.	75
Columbus Die Tool and Machine Co.	256
Commander Mfg. Co.	252
Cone Automatic Machine Co.	71
Consolidated Machine Tool Corp.	57
Continental Screw Co.	189
Corbin Screw Div. American Hdwe. Corp.	189
Cosa Corporation	261
Cross Co.	157
Cullen-Friestedt Co.	192
Cushman Chuck Co.	233
Danly Machine Specialties Inc.	84
Davis & Thompson Co.	236
Davis Keyseater Co.	254
Dayton Rogers Mfg. Co.	186
Defiance Machine Works, Inc.	177
Denfis Chemical Laboratories, Inc.	190
Desmond-Stephan Mfg. Co.	164
Detroit Die Set Corp.	244
Detroit Reamer & Tool Co.	184
Dodge Mfg. Corp.	230D
Dumore Co.	241
DuPont de Nemours & Co., Inc., Electrochemicals Dept.	193
Earle Gear & Machine Co.	235
Eastern Machine Screw Corp.	256
Elco Tool & Screw Corp.	189
Electrol Inc.	210
Errington Mechanical Laboratory	256
Federal Electric Products Co.	205
Federal Machine & Welder Co.	183
Fellows Gear Shaper Co.	6, 7
Ferracute Machine Co.	169
Foote-Burt Co.	142
Formsprag Co.	237
Fosdick Machine Tool Co.	62
Gallmeyer & Livingston Co.	212
Ganschow Gear Co.	234
Gardner Machine Co.	30
Gear Grinding Machine Co.	237
Gear Specialties Mfrs.	61
General Electric Co., Apparatus Dept.	69
Geometric Tool Co.	40
Gisholt Machine Co.	51, 60
Gleason Works	3
Gorham Tool Co.	207
Gorton Machine Co., George	185
Goss & de Leeuw Machine Co.	257
Grant Gear Works	235
Grant Mfg. & Machine Co.	228
Gray Co., G. A.	66
Greenfield Tap & Die Corp.	39
Hannifin Corporation	260
Harper Co., H. M.	189
Harrison Radiator Div., General Motors Corp.	206
Hartford Special Machinery Co.	235, 254
Haynes Stellite Company	208
Heald Machine Co.	2nd Cover
Hendey Machine Co.	214
Holliday & Co., W. J.	182
Honan-Crane Corp.	194
Hones, Inc., Charles A.	258
Houghton & Co., E. F.	216
Hyatt Bearings Div., General Motors Corp.	204
Hypro Tool Co.	170
Independent Pneumatic Tool Co.	8, 9
Index Machine Co.	174
Jacobs Manufacturing Co.	247, 248
Johnson Bronze Co.	176
Jones & Lamson Machine Co.	58
Jones & Laughlin Steel Corp.	161
Kaufman Mfg. Co.	260
Kennametals Inc.	202
King Machine Tool Co.	67
Knight Machinery Co., W. B.	230
Korfund Co., Inc.	250
L & J Press Corporation	188
Lake Erie Engineering Corp.	28, 29
Laminated Shim Co., Inc.	190
Lamson & Sessions Co.	189
Landis Machine Co.	10, 11
Landis Tool Co.	12, 13
Langelier Mfg. Co.	258
LeBlond Machine Tool Co., R. K.	3rd Cover
Leland-Gifford Co.	254
Lincoln Electric Co.	167
Link Belt Co.	16
Linley Brothers Co.	257
Littell Machine Co., F. J.	242
Lodge & Shipley Co.	149

ADVERTISERS INDEX

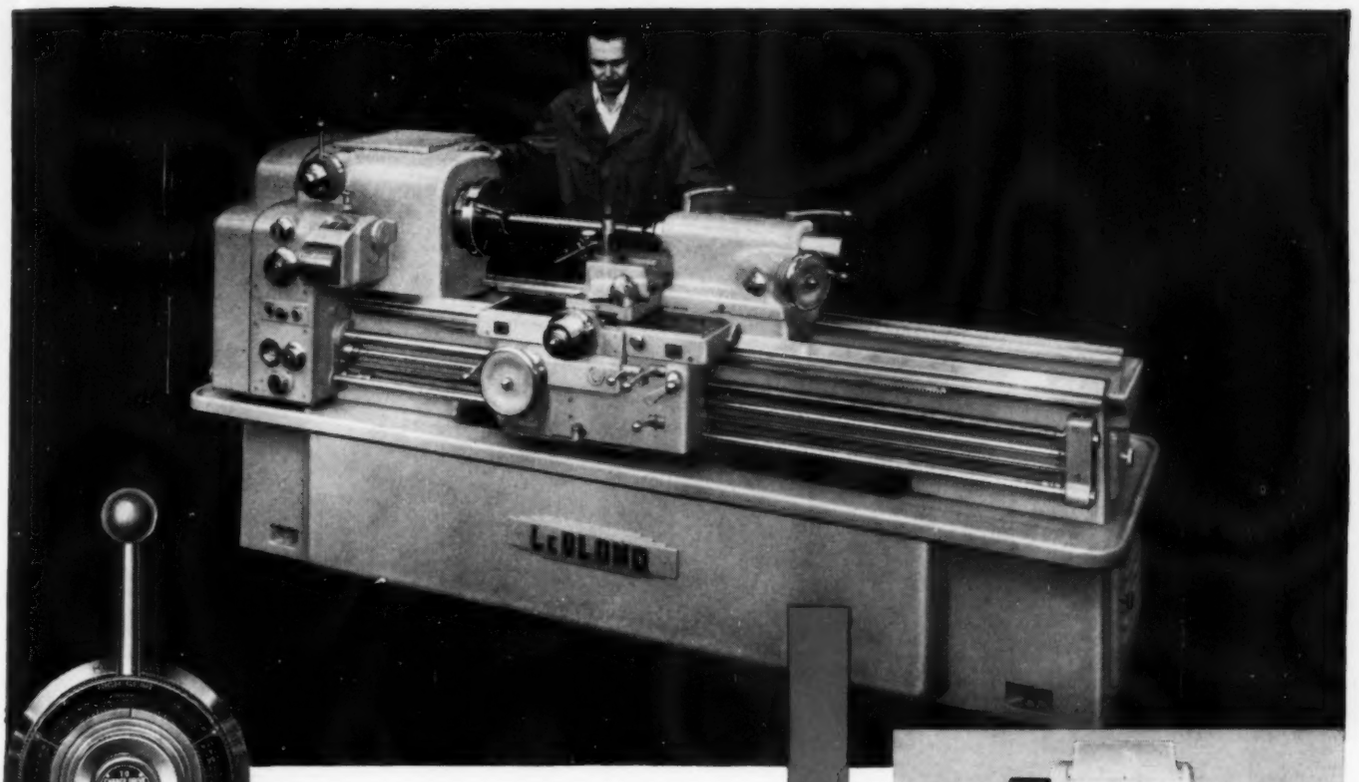
	PAGE
Lovejoy Tool Co., Inc.	178
Luers, J. Milton	257
M & N Machine Tool Works	258
Macmillan Co.	172
Mahon Co., R. C.	221
Manheim Mfg. & Belting Co.	263
Matco Tool Co.	260
McGraw-Hill Book Co., Inc.	232, 244
Mead Specialties Co.	182
Meisel Press Mfg. Co.	234
Mercury Engineering Co.	242
Merz Engineering Co.	200
Milford Rivet & Machine Co.	189
Modern Tool Works Div. of Consolidated Machine Tool Corp.	57
Monarch Machine Tool Co.	159
National Acme Co.	17
National Automatic Tool Co., Inc.	151
National Lock Co.	189
National Machinery Co.	198
National Machine Tool Co.	254
National Screw & Mfg. Co.	189
National Tool Co.	209
National Twist Drill & Tool Co.	25
Newark Gear Cutting Machine	234
New Britain-Gridley Machine Div., New Britain Machine Co.	146
New England Screw Co.	189
Niagara Machine & Tool Works	35, 36, 37
Nicholson & Co., W. H.	258
Nicholson File Co.	217
Northwest Chemical Co.	239
Norton Company	18, 19
Oakite Products Inc.	226
Oliver Instrument Co.	264
Orange Roller Bearing Co., Inc.	139
Osborn Manufacturing Company	175
Parker-Kalon Corp.	189, 203
Pawtucket Screw Co.	189
Peninsular Grinding Wheel Co.	26, 27
Pheoll Manufacturing Co.	189
Phillips Screw Manufacturers	189
Pittsburgh Gear Co.	234
Pittsburgh Plate Glass Co., Brush Div.	81
Pope Machinery Co.	225
Potter & Johnston Co.	77
Pratt & Whitney Div., Niles-Bement-Pond Co.	76
Production Machine Co.	252
Railway Express Agency Air Exp. Div.	250
Reading Screw Co.	189
Reed Rolled Thread Die Co.	264
Reeves Brothers Inc.	181
Reid Brothers Co., Inc.	242
Rivett Lathe & Grinder Inc.	70
Robertson Mfg. Co.	211
Royal Products	242
Russell Burdsall & Ward Bolt & Nut Co.	189
Sales Service Machine Tool Co.	192
Scherr Co., Inc., George	186
Schrader's Son, A.	187
Scovill Manufacturing Co.	189
Seaboard Screw Corp.	189
Seneca Falls Machine Co.	227
Severance Tool Industries Inc.	228
Shakeproof, Inc.	189
Sheldon Machine Co., Inc.	258
Shore Instrument & Mfg. Co., Inc.	260
Simonds Saw & Steel Co.	52
South Bend Lathe Works	219
Southington Hardware Mfg. Co.	189
Springfield Machine Tool Co.	64
Square D Co.	201
Standard Oil Co. of California	213
Standard Oil Co. (Indiana)	265, 266
Standard Pressed Steel Co.	20, 226
Starrett Co., L. S.	140
Steel Company of Canada, Ltd.	189
Steelweld Machry. Div., Cleveland Crane & Engineering Co.	153
Sterling Bolt Co.	189
Sterling Electric Motors Inc.	229
Sterling Grinding Wheel Div.	245
Stewart Warner Corp.	165
Strong Carlisle & Hammond Co.	252
Stronghold Screw Products Inc.	189
Stuart Oil Co. Ltd., D. A.	228
Sunnen Products Co.	78
Tannewitz Works	228
Texas Co.	88
Thomas Hoist Co.	180
Timken Roller Bearing Co.	4th Cover
Transocean Trading Co.	246
Union Carbide & Carbon Corp.	208
Union Twist Drill Co.	53
United States Machine Tool Co.	238
United States Products Co.	262
United States Steel Corp.	232
U. S. Steel Export Co.	232
U. S. Steel Supply Co.	232
V. & O. Press Co.	260
Van Keuren Co.	48
Vulcan Tool Corp.	59
Wade Tool Co.	80
Wales-Beech Corp.	189
Waltham Machine Works	226
Warner & Swasey Co.	31
Wendt-Sonis Co.	166
Westinghouse Electric Corp.	73, 74
White & Bagley Co.	264
Whitman & Barnes	259
Wilson, K. R.	65
Wilson Mechanical Instrument Co.	262
Winter Brothers Co.	24
Wolverine Bolt Co.	189
Wysong & Miles	188
Youngstown Sheet & Tube Co.	255

SEARCHLIGHT SECTION
(Classified Advertising)

	Page
EMPLOYMENT	
Positions Vacant	268
Selling Opportunities Offered	268
Positions Wanted	268
Employment Services	268
SPECIAL SERVICES	
Contract Work	268
Dayton Rogers Mfg. Co.	268
General Pattern Works	268
Kamis Engineering Co.	268
Orange Pattern Works	268
Nueske Tool & Machine Corp.	268
Portage Machine Co.	268
Premier Mill Corp.	268
Slocomb Corp. F. F.	268
BUSINESS OPPORTUNITIES	
Offered	281

ADVERTISERS INDEX

Aaron Machinery Co.	277
Bennett Machinery Co.	278
Botwinik Bros. Inc.	280
Botwinik Bros. of Mass., Inc.	276
Brooks Inc., B. D.	278
Brown Machine & Tool Corp.	276
Brownell, Hazard	281
Capitol Machinery Corp.	274
Cincinnati Machinery Co.	274
Continental Salvage & Machy. Corp.	276
Cox Machinery Co.	272
DeWitt Tool Corp.	280
Dony Machinery Co.	281
Eastern Machinery Corp.	271
Emerman Machinery Corp.	272
Falk Machinery Co.	269
Galbreath Machinery Co.	281
Gallmeyer & Livingston Co.	280
Haag, Joseph	280
Harrison Machinery Exchange, Inc.	276
Hill-Clarke Machinery Co.	279
Howarth Machinery Co.	280
Hyman & Son, Joseph	278
Indianapolis Machy. & Supply Co.	275
Judge & Co., Inc., Frank M.	280
Lang Machinery Co.	281
McDonald Machinery Co.	278
Memphis Casting Works	280
Miles Machinery Co.	274
Morey Machinery Co.	273
National Machinery Exchange	278
Noll Equipment Co.	278
O'Connell Machinery Co.	280
Osborne & Sexton Machinery Co.	276
Paul's Machinery Co.	276
R & H Machinery Inc.	278, 280
Reynolds Machinery Co.	276
Schultz & Anderson Co.	281
Sier-Bath Gear & Pump Tool Co.	274, 281
Simmons Machine Tool Co.	281
Snow Co., Ferdinand J.	278
United Machinery & Tool Corp.	270
Victor Machinery Exchange	272
Vimalert Co., Ltd.	278
West Penn Machinery Co.	281
Winston Machinery Co., Inc.	274, 280

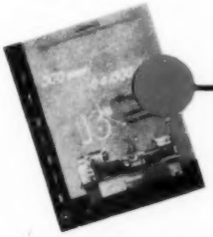


Shift over 300 speeds with this lever on the new 16" LeBlond Model RT Tool Room lathe

Never before have so many important new advantages been built into one tool room lathe as on the new 16" LeBlond Model RT. With the variable voltage headstock you can shift over 100 speeds in each of three ranges without stopping the spindle. With the universal quick change box you select from the greatest range of threads, leads and feeds.

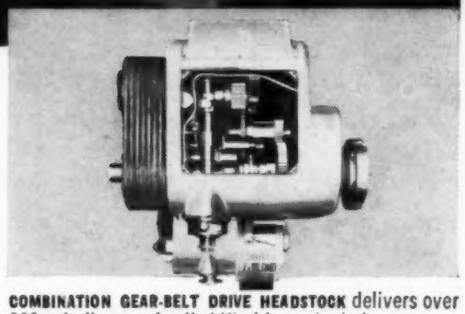
The 4-directional power rapid traverse moves carriage, cross slide, and tailstock electrically. One-piece apron with single lever length and cross feed control . . . thrust-lock tailstock with spindle travel dial . . . automatic lubrication throughout headstock, feed box, and apron . . . and many other advantages are included as standard.

There's a place in every modern plant for the new Model RT, the production tool room lathe. Maybe there ought to be one in yours?



send for

your free copy of Bulletin RT-31.



COMBINATION GEAR-BELT DRIVE HEADSTOCK delivers over 300 spindle speeds all shifted by a single lever.

UNIVERSAL QUICK CHANGE BOX offers widest possible range of threads, leads and feeds.

ONE-PIECE DOUBLE WALL APRON with positive jaw feed clutch and automatic lubrication.

THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

New York 6, N. Y., Singer Building, 149 Broadway, COurtland 7-6621
Chicago 6, Ill., 20 N. Wacker Drive, STAte 5561
Philadelphia 40, Pa., Beury Bldg., 3701 N. Broad, SAgamore 2-5900
Detroit 2, Michigan, New Center Building, TRinity 3-5561

LeBLOND

NEW TIMKEN® "DOUBLE-ZERO" BEARING

...raises the standards of accuracy in high precision applications!

UNTIL now, the most accurate Timken® bearing on the market has been the "Zero" bearing, with a maximum run-out of 150 millionths of an inch. This precision Timken bearing has made possible high standards of accuracy throughout industry.

Now The Timken Roller Bearing Company has developed the "Double-Zero" bearing which is *twice as accurate* as the "Zero"! Maximum run-out is only 75 millionths of an inch, and the average run-out is well under this.

It offers an opportunity for new and greater precision in machine tool spindles, scientific instruments, and many other applications where extreme accuracy is essential.

As an extra step in manufacture, after assembly, a natural and true geometric contact is generated between all rotating parts of the "Double-Zero" bearing. This results in a "Generated Unit Assembly". It assures positive roll alignment, long lasting precision, permanent adjustment and smoother operation.

The "Double-Zero" bearing is the latest example of Timken leadership in serving the bearing needs of all industry . . . one more reason why it pays to look for the trade-mark "Timken" on every tapered roller bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

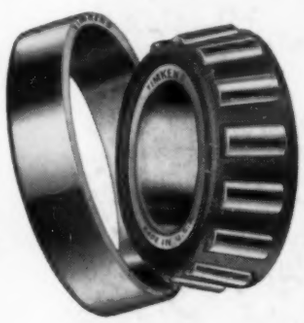
This label on a product means its bearings are the best.

A PRECISION TIMKEN BEARING FOR EVERY REQUIREMENT			
CLASS	**"00" (DOUBLE-ZERO)**	**"0" (ZERO)**	**"3" (THREE)**
RUN-OUT	.000075"	.000150"	.000300"
TYPES AVAILABLE	Standard Single Row	Standard Single Row	All types
SIZE RANGE	Up to 10" O.D.	Up to 12" O.D.	Up to 12" O.D.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION →✳←